SECTION 12

CLOSURE PLAN

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SECTION 12

CLOSURE PLAN

12.1 Facility Information

Facility Name:	Ford Allen Park Clay Mine Landfill
EPA I.D. Number:	MID 980 568 711
Owner and Operator:	Ford Motor Company c/o Environmental Quality Office 15201 Century Drive, Suite 608 Dearborn, Michigan 48120
Facility Address:	17005 Oakwood Boulevard Allen Park, Michigan 48101
Facility Telephone:	313/390-3209
Facility Contact:	Jerome S. Amber, P.E. Mgr., Site Management and Investigation 15201 Century Drive, Suite 608 Dearborn, Michigan 48120 313/322-4646

12.2 Facility Conditions

12.2.1 General Information

The overall landfill site is composed of approximately 189.7 acres of solid waste landfill, 16.5 acres of hazardous waste landfill, and 37 acres of greenbelt and was encumbered by easements.

The hazardous waste disposal cells (Cells I and II) were constructed in excavation created during clay mining activities which created a 16.5 acre excavation approximately 35 feet deep. Hazardous waste landfilling activity began in the east corner of Cell I where the following waste volumes were disposed, prior to partial closure of Cell I in 1986 and 1987:

7,193	cubic yards of K061
6,788	cubic yards of K087
16,136	cubic yards of Blast Furnace Cake
3,612	cubic yards of Basic Oxygen Furnace Dust
66,000	cubic yards of soil (daily cover)
99,729	cubic yards, total

12.2.2 Partial Closure of Cell I

The minimum technological requirements of the 1984 Hazardous and Solid Waste Amendments (HSWA) necessitated the premature partial closure of Cell I and the redesign of Cell II.

The closure of Cell I involved the following activities as indicated on the Engineering Drawings dated February 3, 1987.

(1) Installation of a leachate collection system in the south corner of Cell I.

(2) Redistribution of waste from the east corner to achieve final grades.

(3) The addition of a vertical extension to the existing perimeter dike to achieve final grades.

(4) The area outside the closed cell that held contaminated waters from the waste fill was excavated to remove contaminated soils. The top 6 inches of the area was removed and placed in the closed portion of Cell I.

(5) Landfill an estimated 39,000 cubic yards of nonhazardous waste in the south corner to provide the appropriate slopes to support the liner for Cell II. The interface slope between Cell I and Cell II was tested and evaluated with the results provided in the closure certification. The evaluation was the basis for a portion of the Cell II design.

(6) Application of final cover to Cell I.

12.3 Final Cover for Cell II

12.3.1 Purpose

The purposes for the final cover are (1) to minimize long-term effects of percolation from precipitation into the waste, (2) to function with a minimum of maintenance, (3) to promote drainage while minimizing erosion, and (4) to maintain integrity in the event of limited settlement of the waste surface. The cover system interfacing the adjacent solid waste disposal areas to the north, west, and south sides of Cell II, will have nonhazardous solid waste overlying the hazardous waste Cell II cover system so as to integrate Cell II with adjoining landfill activities. Refer to the attachments for an evaluation of the final cover design and to the Engineering Drawings in the Supplemental Information notebooks for the construction details.

12.2.2 Partial Closure of Cell II

The large area of Cell II (12 acres) and its projected minimum life span of 10 years will necessitate the on-going partial closure of Cell II as the filling operation progresses in order to

minimize the generation of leachate. Such partial closures will take the form of incremental extensions of the cover system that will initiate from Cell I.

As the waste fill is brought to final grade, stormwater will be controlled with the use of constructed berms and ditches to route the water away from the final cover system and channel it down to the front of the waste fill face where the leachate collection system can discharge the water to the sanitary sewer. These temporary berms and ditches will be removed prior to extending the cover system.

Each cover system extension will require the existing compacted clay component to be notched or cut back so that the new clay cap extension can be horizontally "keyed-in" into the existing clay.

12.3.3 Design Elements

The final cover system must consist of the following elements (from bottom to top):

1. A bedding layer (installed according to this section) above the surface consisting of a minimum of 12 inches of silt, clayey silt, or silty clay with a classification of ML, CL-ML, or CL as determined by ASTM Method D2487-69.

2. A minimum of 3 feet of clay (CL or CH material with a minimum of 25 percent of the soil having a grain size of 5 microns or less) to be compacted in 10 inch maximum lifts to at least 90 percent of the Modified Proctor maximum dry density. The moisture content of the clay cover will range from 2 percent below to 5 percent over the optimum. The permeability of the compacted clay cover will be less than 1×10^{-7} cm/s.

3. A 20-mil-thick Poly Vinyl Chloride (PVC) flexible membrane liner (FML) installed according to this section.

4. A geosynthetic drainage layer.

5. A compacted soil layer, placed directly over the drainage layer, consisting of a minimum of 3 feet of compacted clean fill.

6. A minimum of 6 inches of topsoil, seeded, and mulched.

7. A vegetative crop to be established according to this section.

Revised drawings 3, 9, 11, and 14 are included in Appendix 12C detailing the revised final cover system.

12.3.4 Final Contours

The final contours of the constructed final cover must result in slopes between 3 percent and 5 percent and must conform to the topography for Cell II as shown on the Engineering Drawings. Deviations from the elevations greater than 0.5 feet must be approved by the MDNR.

12.3.5 Gas Wells

The waste materials as listed in Section 1 are not believed to generate gases. Therefore, gas venting wells will not be installed.

12.4 Schedule for Activities for Final Closure of Cell II

May 1, 2004	On-Site Disposal Complete
June 1, 2004	Facility Decontamination
July 1, 2004	Finish, Grade, and Proof Roll Liner Bedding
August 1, 2004	Complete Installation of 20-mil FML and Installation of FML Protection/Drainage Layer
October 1, 2004	Complete Construction of Clay Cap
October 15, 2004	Complete Final Grading of Topsoil
October 30, 2004	Fertilize, Seed, and Mulch to Establish Final Cover Crop

12.5 Maximum Waste Inventory

An inventory of waste will be maintained at the site operations building.

12.6 Decontamination of Facility Equipment

Equipment which comes in contact with hazardous waste including wheel wash equipment will be decontaminated with a high-pressure water spray. Wastewater will be collected and properly disposed. Shoulders of the paved haul road will be sampled to determine levels of potential contamination. Sampling and analytical procedures are provided in Attachment 12A. Should the sampled area indicate contamination above background concentrations for inorganics and above the method detection limit for organics, the soil shall be considered contaminated, excavated, and disposed at a properly licensed facility to comply with R299.9613 and 40 CFR 264.122(b)(4).

12.7 Construction Specifications for Final Cover of Cell II

12.7.1 Construction of Bedding Layer

1. The layer upon which the flexible membrane liner (FML) is to be placed consists of a minimum of 12 inches of silt, clayey silt, or silty clay with an ASTM Method D2487-69 classification of ML, CL-ML, or CL.

2. The upper 4 inches of the layer must not contain particles larger than 1 inch in diameter.

3. The surface of the layer must be rolled with a smooth steel drum or pneumatic roller so as to be free of irregularities, loose earth, and abrupt changes in grade.

4. The FML installer must provide written certification as to the acceptability of the surface preparation of the layer prior to each days installation of FML.

5. Ford must make provisions for material, personnel, and equipment necessary to maintain an accept surface of the bedding layer for FML installation.

6. Ford must obtain direct layer thickness measurements at a rate of at least once per every half-acre to verify conformance with design requirements.

12.7.2 Construction of Clay Layer

1. The compacted, fine-grained cohesive soil layer must be placed over the FML protection drainage blanket layer described in Section VI C of this plan.

2. The field density-moisture of the liner material shall be determined utilizing the provisions of ASTM Standard D2922-78 for each 1,000 cubic yards placed, with a minimum of one test per day of construction or layer of clay placed.

3. The particle-size distribution (sieve and hydrometer), Atterberg limits according to ASTM Standard D423-66 and ASTM Standard D424-59, and natural moisture content according to ASTM Standard 422-63 of random samples of clay liner material from each 5,000 cubic yards shall be determined.

   Samples must have more than 25% of the soil particles less than 5 microns in size and comply with the criteria for a unified soil classification CL or CH as determined by the provisions of ASTM Standard D2487-69.

4. The density of the liner materials shall be determined by the Modified Proctor test, ASTM Standard D1557-70, when the texture of the soil changes and every 5,000 cubic yards placed.

5. The permeability with water of a soil sample shall be determined with water every 10,000 cubic yards placed by the constant head method, ASTM Standard 2434-68; triaxial cell method, as described in the EPA document entitled "Soil Properties, Classification, and Hydraulic Conductivity Testing," which is adopted by reference in R299.11008; or other method approved by the director on a sample which is not less than 3 inches in diameter.

6. Clay should be placed in horizontal lifts of not more than 25 centimeters and be uniformly and thoroughly compacted to the standards approved in the design.

   However, the material shall not be compacted to less than 90 percent of the dry density, as determined by the Modified Proctor test described in the provisions of ASTM Standard D1557-70, adopted by reference in R299.11001, and the moisture content shall be within a range of -2% to +5% of the optimum moisture content.

7. The compacted clay should have a maximum permeability coefficient of 1.0×10^{-7} cm/sec or less at all points.

8. No frozen soil may be used in any lift, nor may any soil be placed on a frozen base.

9. The soil must not be placed in a manner that would trap ponded water.

10. Material, personnel, and equipment such as discs, harrow or plow, and sprinkling system must be available.

12.7.3 Installation of Flexible Membrane Liner

The Poly Vinyl Chloride (PVC) flexible membrane liner (FML) must be installed directly over the bedding layer described in this plan, by an organization (installer) which is responsible for:

- Receipt, installation, and handling of FML materials and equipment;
- The unrolling, placing, seaming, testing, and repairing of the FML during installation;
- And other aspects as assigned in this Section.

12.7.3.1 FML Installer

The installer must be trained and qualified to install the type of FML to be used for the project. To demonstrate the necessary training and qualifications, the installer must provide Ford and the Independent Registered Professional Engineer (IRPE), required by 40 CFR 265.115 with a minimum of 250,000 square meters containing the following information:

> Name and purpose of project, location, date, name of owner designer manufacturer, leader of the installer's crew, type of FML, thickness, surface area, type of seaming, duration of installation, and available written information on the performance of the project.

12.7.3.2 Basis of Design

At a minimum, the FML sheet must meet the specifications stated in the following excerpt adapted from the letter dated May 8, 1986, that was developed by Neyer, Tiseo, and Hindo, LTD., Consulting Engineers.

"We have prepared an evaluation of the stresses on a 20-mil PVC liner during installation. In addition, we have calculated the percent elongation of the liner following settlement of the fill and consolidation of underlying clay. Finally, we compared these values with tensile and elongation standards published for PVC liners to determine whether or not the maximum allowable tensile stress and elongation might be exceeded during placement of the liner and/or following settlement of underlying materials. Based on our calculations, we have concluded that the stress and strain on a 20-mil PVC liner during installation or following settlement should not exceed the allowable standard.

During installation, the liner will be subjected to stresses from liner handling and placement. These stresses can be minimized by carefully following the manufacturer's placement instructions. However, placement of the liner on the sideslopes will probably cause a tension stress in the liner while it is supported only along the slope crest. Our calculations indicate that the tensile stresses acting on the 20-mil PVC liner during installation is approximately 0.12 pounds per inch width. This value is less than the minimum tensile strength standard of 46 pounds per inch width for the 20-mil PVC. Standards for flexible membrane liners are listed in the National Sanitation Foundation (NFS) Standard 54 for Flexible Membrane Liners (1985).

Following placement, the liner will experience elongation due to settlement.

In our calculations, we conservatively assumed that the maximum settlement beneath the landfill cell would be imposed at the toe of the sideslopes (in reality, it would be expected to occur near the center of the cell), and calculated the tensile strains that the liner would

experience. Our calculations show that the percent elongation of the liner due to settlement is approximately 4 percent. Standard 54 lists the elongation at break for unsupported 20-mil PVC to be 300 percent. The allowable elongation in this liner is significantly greater than 4 percent.

Based on these considerations, we do not expect damage to the liner to occur as a result of elongation following settlement."

12.7.3.3 Raw Materials

The FML must be manufactured of first quality newly produced materials. The use of reclaimed polymers and other materials is not permitted. Recycling of materials containing reinforcing scrim is not permitted. Recycling scrap that does not contain scrim is permitted.

The FML Manufacturer must provide Ford and the IRPE with (i) a statement identifying the origin of raw materials; (ii) a copy of any quality control certificates issued by the producer of raw materials; and (iii) reports on any tests conducted to verify the quality of the raw materials.

12.7.3.4 Rolls

1. The FML must be designed and manufactured specifically for the purpose of fluid containment.

   The FML must be free of holes, blisters, undispersed raw materials, and any sign of containment by foreign matter.

2. The FML must be a minimum of 20 mils thick.

3. The following information shall be provided by the FML manufacturer as an indication of the quality of the material supplied:

   Material properties sheet pertaining to the FML to be used for the project, containing results of tests for tensile properties and project tear resistance as specified by the National Sanitation Foundation (NSF).

   The sheet must also provide any minimum properties guaranteed by the FML Manufacturer and indicate test methods used. Quality control certificates pertaining to the rolls of material delivered to the site must

accompany the rolls. Each roll shall be identified by a unique manufacturing number.

The quality control certificate shall be signed by a responsible party employed by the FML manufacturer, such as production manager, and shall be certified.

12.7.3.5 Factory Seaming

1. If the FML rolls are fabricated into designed blanket sizes before delivery to the site, one of the following seaming techniques must be used: adhesive, heat seaming, or dielectric seaming.

2. The overlap must provide the minimum required seam width.

   The seam must extend to the edge of the sheet, so that no loose flap is present on the top side of the blanket. A loose flap is permissible on the bottom side of the fabricated blanket.

3. The rolls must be laid out without tension and seamed without wrinkles or fishmouths. If wrinkles occur within the sheet due to the seaming process, the wrinkle must not extend into the seamed width. Wrinkles which extend into the seamed width must be treated as specified in Section 12.7.2.9.

4. The overlap area to be seamed must be free from moisture, dust, dirt, debris of any kind, and foreign material.

   The fabrication area must be in a clean, enclosed, temperature-controlled facility.

5. Adhesive seaming shall be used with the PVC FML. Any adhesive used for seaming the rolls together must not be deleterious to the FML material in any way after seaming.

   The adhesive product must be applied as specified by the FML manufacturer with special attention to the ambient temperature and rolling pressure. The adhesive must be tested for longevity in contact with the FML material and its application must not result in appreciable stiffening of the FML. Prepared adhesive tapes must not be used.

6. The minimum seam widths shall be 25 mm (1 inch).

12.7.3.6 Packaging of FML

FML rolls or blankets must be packed and labeled prior to shipment to the site. The label must indicate the FML manufacturer, type of FML, thickness, and roll or blanket number.

12.7.3.7 Transportation of FML

When transported to the site, FML rolls or blankets must be handled by appropriate means so that no damage is caused. Wooden cases must be strong enough to withstand impacts and rough handling without breaking or splintering.

On-Site Storage of FML

The FML must be protected from direct sunlight and heat to prevent degradation of the FML material and adhesion of individual whorls of a roll or layers of a blanket.

Adequate measures must be taken to keep FML materials away from possible deteriorating sources (i.e., vandalism, theft).

On-Site Handling of FML

Appropriate handling equipment must be used when moving the rolled or folded FML from one place to another.

Panel Placement of FML

1. Each roll or blanket must be redesignated with a panel number. A panel is the unit area of in-place membrane which is to be seamed (i.e., one roll may be cut into several panels). Instructions on the boxes or wrapping containing the FML materials must be followed to assure the panels are unrolled or unfolded in the proper direction for seaming. Only the panels which are to be anchored or seamed together in 1 day shall be unrolled or unfolded.

   Case must be exercised to not damage the FML during this operation. All workers must wear shoes which will not damage the FML.

2. Pulling FML panels must be minimized to reduce permanent tension.

3. The following precautions must be taken to minimize the risk of damage by wind during panel placement.

   No more than one panel should be unrolled prior to seaming (unless otherwise authorized by the installer);

   Work shall be oriented according to the direction of prevailing winds if possible;

   Adequate loading on FML panels to prevent uplift by winds must be provided by sand bags, tires, or any other means which will not damage the FML.

   Along the edges, loading must be continuous, to avoid possible wind flow under the panels.

4. Any panels which become seriously damaged (torn or twisted permanently) must be replaced. Less serious damage must be repaired as specified.

5. FML placement must not be done during precipitation events.

12.7.3.8 Considerations of Site Geometry

Layout Drawings

The FML installer must provide Ford and the IRPE with layout drawings of the proposed FML placement pattern and seams prior to FML placement. The drawings must indicate the panel configuration and location of seams. Field seams should be differentiated from factor seams (if any). In general, seams should be oriented parallel to line of the maximum slope. In corners and odd-shaped geometric locations, the total length of field seams should be minimized. No seams should be placed at the toe, but should be a minimum of 1.5 m (5 feet) away from the toe of the slope.

Installation Around Appurtenances

1. The FML must be installed around the leachate collection manhole and a FML sleeve or shield must initially be installed around the concrete riser. After the FML has been placed and seamed, the final field seam connection between the appurtenance sleeve or shield and the FML must be completed. A sufficient initial overlap of the appurtenance sleeve must be maintained so that shifts in location of the FML can be accommodated. The installation of the leachate discharge pipe through the FML will be as shown on the Engineering Drawings.

2. All clamps, clips, bolts, nuts, or other fasteners used to secure the FML around each appurtenance must have a life-span equal to or exceeding the FML.

12.7.3.9 Field Seaming

Requirements of Personnel

1. All personnel performing seaming operations must be qualified by experience or by successfully passing seaming tests.

2. At least one seamer must have experience seaming at least one hundred thousand square meters (1.07 million sq. ft) of the FML of the same generic type as the FML used for the project using the same type of seaming method. This master must provide direct supervision over apprentice seamers.

3. Apprentice seamers must be qualified by attending training sessions taught by the master seamer and performing at least two successful seaming tests under similar weather conditions using the seaming method used for production seaming.

Overlapping

The panels shall be overlapped a minimum of 100 mm (4 inches).

Preparation

Prior to seaming, the seam area must be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.

Seaming Equipment and Products

Any adhesive (bodied solvent compound or cement) used shall be formulated in accordance with the FML manufacturer's specifications.

Weather Conditions for Seaming

Weather conditions required for seaming area as follows: (i) no welding shall be done below 1°C (34°F); (ii) between 1°C (34°F) and 10° (50°F), seaming is possible if the FMLs preheated by either sun or hot air device, and if there is not excessive cooling resulting from wind; and (iii) above 10°C (50°F), no preheating is required. In all cases, the FML must be dry.

1. Seaming on horizontal surfaces must commence at the center of a panel side and proceed to either side (if possible) in an effort to reduce wrinkles and subsequent fishmouths at the seam interface.

   The direction of seaming on slopes shall be the most expedient direction for the type of seaming used. Seaming shall extent to the outside edge of panels.

2. If the supporting soil is soft, a firm substrate must be provided by using a homogeneous board or similar hard surface directly under the seam overlap to effect proper rolling pressure.

3. The width of the seam must be 100 mm (4 inches) starting from the edge of the FML placed on top (so there is no loose flap). Any loose flap must be bonded using an adhesive.

Procedure for Seaming Wrinkles

1. Fishmouths or wrinkles at the seam overlaps must be cut along the ridge of the wrinkle back into the panel so as to effect a flap overlap.

   The cut fishmouths or wrinkles must be seamed as well as possible, and then patched with an oval or round patch of the same generic FML extending a minimum of 150 mm (6 inches) beyond the cut in all directions.

2. The patch must be bonded over its entire area, using either a hot air gun or an adhesive (bodied solvent or cement).

Cap-Strips

1. Cap-Strips must be placed on all defective seams which are not repairable by reseaming, as specified within this section. They must be placed only after quality control of the original seam has been performed.

2. Cap-Strips must be at least 75 mm (3 inches) wide and must be centered over the completed seam edge.

   Cap Strips must be of the same generic FML material as the liner but without reinforcing scrim.

   The thickness of the cap-strip must be at least 20 mils.

12.7.3.10 Quality Control and Inspection

1. Test reports, material properties sheets, and quality control certificates must be supplied to Ford and the IRPE by the FML Manufacturer prior to fabrication (or installation if there is not fabrication).

2. The quality control certificates must be reviewed to verify that a certificate has been received for all rolls.

12.7.3.11 Transportation, Handling, and Placement

1. Upon arrival of the FML at the site, the Installer must inspect all materials for defects in manufacturing process and for damage during transportation.

   Materials judged to be severely damaged must be rejected and removed from the site. Minor damages and other defects shall be repaired.

2. The Installer must inspect each panel after placement and prior to seaming, for damage caused by placement operations or by wind. Damaged panels or portions of damaged panels which have been rejected must be marked and their removal from the work area recorded.

3. The Installer must also verify that the weather conditions (air, temperature, non-excessive wind, and lack of precipitation) are acceptable for panel placement.

12.7.3.12 Field Seams

Field Seaming Operations

The installer must verify the following as required, or as presented, by Section 12.7.3.9.

- The seaming personnel have the qualifications required.

- The overlaps meet the specified requirements.
- The seaming area is clean.
- A hard substrate such as a board is used if the supporting soil is soft.
- Seaming equipment and adhesive products are available on the site.
- Weather conditions for seaming are acceptable.
- Seaming procedures are followed.
- The panels are properly positioned to minimize wrinkling and wrinkled areas are seamed.
- All cap-strips are properly placed.
- Equipment for testing seams is available on-site.

Test Seams

a. Test seams must be performed to verify that seaming conditions are adequate.

   Test seams shall be conducted at the Installer's discretion and at least two times each day (at the beginning of the morning and the beginning of the afternoon), for each seaming equipment or adhesive product used that day. Also, each seamer must perform under the same conditions as production seaming. The test seam must be at least 0.6 m (2 feet) long.

b. Specimens must be cut from the test seam. These specimens must be 50 mm (2 inches) wide. Specimens shall be tested by hand in shear strength, and shall not fail in the joint. If the test seam fails, an additional test seam shall immediately be conducted.

   If the additional test seam fails, the seaming equipment or product must be rejected and not used for production seaming until the deficiencies are corrected and a successful test seam is produced.

c. A sample from each test seam must be retained and labeled with the date, ambient temperature, number of seaming units, seamer, and pass or fail description. One half of the sample must be given to the FML installer for subsequent laboratory testing and other half retained by Ford.

Non-Destructive Seam Testing

a. All field seams must be non-destructively tested over their length. Each seam must be numbered or otherwise designated. The location, date, test unit, name of tester, and outcome of all non-destructive testing must be recorded by the Installer.

b. Testing must be done as the seaming progresses, not at the completion of all field seaming. All defects found during testing must be numbered and marked immediately after detection. All defects found must be repaired, retested, and remarked to indicate completion of the repair acceptability.

c. The test unit shall be air lance or vacuum test unit.

Verification of Seam in Special Locations

a. All seams in special locations must be non-destructively tested if the seam is accessible to testing equipment. If the seam cannot be tested in-place, but is accessible to testing equipment prior to final installation, the seam must be non-destructively tested prior to final installation (i.e., seams around pipes and gas wells). If the seam cannot be tested in-place, prior to final installation, it must be observed by FML installer for final uniformity and completeness.

b. The seam number, date of observation, name of tester, and outcome of the test or observation must be recorded.

c. All defective seams must be promptly repaired, retested, and remarked to indicate completion of the repair.

12.7.3.13 Defects of Repairs

Identification

a. All seams and non-seam areas of the FML must be inspected for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.

b. The surface of the FML shall be clean at the time of inspection.

Sweeping and/or washing of the FML surface is required if the amount of surface dust or mud inhibits inspection.

Evaluation

Each suspect location both in seam and non-seam areas must be non-destructively tested using the methods described in this Section.

Each location which fails the non-destructive testing must be marked and repaired.

Repaired Procedures

Defective seams must be repaired by reseaming or applying a capstrip. Tears or pinholes must be repaired by seaming or patching. Blisters, larger holes, undispersed raw materials, and contamination by foreign matter shall be repaired by patches. Each patch must be numbered. Patches must be round or oval in shape, made of the same generic FML, and extend a maximum of 150 mm (6 inches) beyond the edge of defects.

Verification of Repairs

Each repair must be non-destructively tested using the methods described in this Section. Tests which pass the non-destructive tests are taken as an indication of an adequate repair. Failed tests must be reseamed and retested until a passing test results. All non-destructive testing of repairs and the number of each patch, date, location, patcher, and test outcome must be recorded.

12.7.4 Documentation of FML

12.7.4.1 Material Quality Control Certificates

The quality control certificates pertaining to raw materials and manufactured FML rolls must be provided by the FML Manufacturer to Ford prior to installation.

The test results shall be reviewed for completeness and for compliance with the required minimum properties for both the raw materials and manufactured rolls. Materials and rolls which are in non-compliance with the minimum required properties must be rejected.

12.7.4.2 Daily Field Installation Reports

A. The FML installer must provide Ford with daily reports of: (i) the total amount and location of FML placed, (ii) total amount and location of seams completed and seamer and units used; (iii) changes in layout drawings; (iv) results of test seams; (v) location and results of non-destructive testing; (vi) location and results of repairs and; (vii) location of destructive test samples.

B. Ford representatives must record daily all activities of the FML installation which shall include, but are not limited to:

- Receipt of written daily acceptance of surface preparation from the FML installer;

- Observations of field seaming operations, including weather conditions, cleaning, overlaps, rate of seaming, names of seamers, and units used;
- Observations of seams around appurtenances, and connection to appurtenances;
- Observation of non-destructive seam testing, including testing location of defects and testing unit used;
- Observations of repairs and testing, including locations, name of repairer, and seaming equipment or product used.

12.7.5 Installation of Geosynthetic Drainage Layer

1. The geotextile portion of the drainage layer shall be constructed of polyester or polypropylene. The geonet portion of the material shall be constructed of HDPE.
2. The transmissivity of geonet shall exhibit a minimum value of $1x10^{-3}$ m^2/s when tested between two geomembranes under a load of 15,000 psi.
3. Geosynthetic material shall be free of defects, rips, holes, and flaws.
4. The geosynthetic material shall be manufactured in widths and lengths that will permit installation of the geosynthetic material with as few laps as possible. The geosynthetic material shall be marked with Manufacturer's name, product identification, lot number, roll number, and roll dimensions.
5. During installation, care shall be taken not to entrap any stones, excessive dust, or moisture that could cause clogging of the drainage system and/or stones that could damage the geomembrane.
6. The drainage layer shall not be welded or tack welded to the underlying geomembrane.
7. The geonet portion of the drainage layer shall be overlapped approximately 4 inches. The geonet shall be joined by colored plastic ties every 5 feet along the roll length and at panel ends.
8. The geotextile portion of the drainage layer shall be overlapped a minimum of 6 inches. Geotextile above the geonet shall be continuously sewn along the roll length per the manufacturers recommendation. Thermal bonding shall not be performed without approval of Ford.

12.7.6 Construction of the FML Protection Layer

1. The material comprising this layer shall be general clean fill. The material shall be free from high organic content matter and refuse, masonry, metal, sharp objects, boulders, snow, and ice. No solid material shall be no more than 3 inches in its largest diameter.

2. Drainage pipe must consist of 4 inches in diameter corrugated polyethylene perforated pipe, placed as shown on the design plans.

   Perforations shall be 0.25 inch in diameter or width and will provide at least 0.25 square inch of open area per foot of pipe length.

3. The pipe must be wrapped with geotextile filter material possessing an equivalent opening size no greater than the opening size of the #70 standard sieve (Amoco Propex 4545).

4. The fill material comprising the layer must be placed on the FML in a manner that does not damage it or the drainage pipe system.

   Pipe bedding placed around the drainage pipe will spread the load of the pipe dissipating stress to the FML.

5. Initial material placement must be done by placing the material at the toe of the lined slope and pushing the material up the sideslope with track-mounted vehicles.

6. The full design thickness of the material layer must be maintained when spreading the material and for construction traffic on the layer.

7. Ford representatives must obtain direct layer thickness measurements at a rate of at least once per every half-acre to verify conformance with design requirements.

8. Calculations for tensile stress during construction acting on the liner with 1 foot of material in place is approximately 0.27 psi. The moduli at 100% elongation listed in Standard 54 (NSF) for 20 mil PVC is 8 pounds/inch width. Since the stress acting on the liner with 1 foot of material in place is less than the stresses that would cause yield, and provided that the granular material is installed in the specified manner, puncturing of the liner should not occur during placement of the protective layer. (Refer to Construction Quality Assurance Plan.)

12.7.7 Topsoil Specifications

1. A layer of topsoil at least 6 inches thick after grading must be placed over the clay described in this Section.

2. The topsoil must be sandy loam, loamy sand, or silt loam confirmed by grain-size analyses conducted according to ASTM Method 422-63 at least once for every 3,000 cubic yards to be placed. (Refer to Construction Quality Assurance Plan.)

3. The top 1/2 inch of the topsoil layer must be loosely packed to provide an acceptable seed bed.

4. Ford representatives must obtain direct measurements of topsoil thickness at the rate of at least once per every half-acre to verify conformance with paragraph 13.7.6.

12.7.8 Vegetative Cover Specifications

1. The topsoil described in VI E must be fertilized with 12-12-12 N-P-K at the rate of 650 pounds per acre.

2. The following seed mix must be sown into the topsoil:

Seed	% by Weight
a. Common Cereal Tye	20 to 30
b. Common Creeping Red Fescue	20 to 30
c. Common Kentucky Bluegrass	5 to 10
d. Kentucky 31 Tall Fescue	100 - (a+b+c)

3. The seed mix must have a germination rate of at least 80%.

4. The seed mix must be applied at the rate of 200-225 pounds per acre.

5. The seed bed must be rolled during or immediately after seed application.

6. Straw mulch must be applied to the seed bed at the even rate of 1.5 to 2 tons per acre in a manner that will minimize subsequent displacement by wind.

12.7.9 Additional Soils

1. Clean fill 1.5-foot lift thickness.

2. Ford representatives must obtain direct measurement of soil thickness at the rate of at least once per every half acre.

12.8 Construction Quality Assurance

Construction quality assurance responsibility will reside with Ford Motor Company. Construction of key elements of the cover system will be performed by the contractors retained by Ford Motor Company.

Construction monitoring activities and testing will be performed by an independent registered professional civil or geotechnical engineer (IRPE), or his representatives to verify that construction is in accordance with the construction requirements and design plans.

The IRPE will prepare a summary report detailing construction activities, observations, test data, construction problems encountered and corrective measures taken, deviations from design or material specifications and as-built drawings.

The IRPE will provide a signed and dated statement of professional opinion to Ford Motor Company regarding construction of the cover system according to the design plans and construction requirements. All such summary reports will be retained in the facility operating record by Ford Motor Company. Refer to CQA Plan.

Certification of closure must consist of a sealed certificate that Cell II has been closed according to the approved closure plan. All quality control data, thickness measurements and elevation data must be included in this certification (See Part I, Condition 36.B of operating license). This must be provided to the department for approval (40 CFR 265.115).

The certification must also provide all summary reports identified in the construction quality assurance program.

12.9 Notifications

Written notification will be provided to the Director requesting a permit modification to authorize a change in the approved closure plan under the following conditions:

- Any time prior to the notification of partial or final closure of the facility.
- Any time changes in operating plans or facility design affect the closure plan.
- Any time there is a change in the expected year of closure
- In conducting partial or final closure activities, unexpected events require a modification of the approved closure plan.

The written notification or request will include a copy of the amended closure plan. Submittal of the written request for permit modification including the amended closure plan will be made at least 60-days prior to the proposed change(s) or no later than 60-days after an unexpected event has occurred.

Written notification will be made no later than 30-days after an unexpected event, if the event occurs during the partial or final closure period.

Notification to the regional administrator will be made at least 60-days prior to the date of beginning closure.

12.10 Certification of Closure

Within 60 days of completion of final closure, certification of closure in accordance with the closure plan, will be submitted to the Director, by registered mail. This document will be signed by Ford and an independent registered professional engineer.

Where appropriate, the following information will be provided as part of the closure certification:

1. Information on material removed from the site during closure for disposal elsewhere (if any).
2. Certification statement by the Owner/Operator AND an independent registered engineer. All independent professional engineer certificates must have an original stamp on at least one copy.
3. Summary of decontamination procedures (pressure wash, steam clean, etc.) for equipment used in the final closure, and the disposal procedures for decontamination wastewater.
4. A detailed summary of closure activities.
5. Results of all tests used to document closure (charts, tables, lab sheets).
6. Statistical comparisons on sampling results over the life of the site to document the impact of the site at the time of closure.
7. Testing procedures used to document closure.
8. Final record drawings of the landfill showing the final cover system in place.
9. A map showing testing locations based on grid stations.
10. Potentiometric well information to document artesian conditions at the site.
11. A map showing detailed final grades of the fill area. Information on material used in the final closure should be detailed.
12. A copy of all field notes pertaining to closure activities.
13. A copy of the approved closure plan and letter of closure plan approval.

12.11 Survey Plat

A survey plat indicating the location and dimensions of the landfill cell(s) with respect to the permanent surveyed bench marks will be submitted, no later than the submission of the certification of closure, to the local zoning authority and to the Director . This plat will display a note which states obligations to restrict disturbance of the Hazardous Waste Disposal Unit. This plat will be prepared and certified by a Professional Land Surveyor.

12.12 Financial Assurance

The financial assurance documentation and detailed cost estimate currently in place are included in Attachment 12B. The costs presented are based on the costs associated with a third-party to close the facility.

The closure estimate has been revised to reflect 1995 costs based on the revised final cover system. This cost will be reflected in future financial assurance filings.

If the site were to accept PCB-containing materials in the future, estimated closure costs would need to be increased by approximately $10,000 to cover equipment decontamination. This cost would be reflected in future financial assurance filings (if necessary).

ATTACHMENT 12A

SAMPLING AND ANALYTICAL PROCEDURES

ATTACHMENT 12A

Sampling and Analytical Procedures

Individual samples of soil material will be collected from both shoulders of the road between Cell II and Oakwood Boulevard. The samples will be cored 3 feet off the roadway to a depth of 3 inches at a sampling interval of 250 feet along the shoulders of the road. The soil monitoring program described in Section 11.3 and Attachment 11D will be used as guidance for collecting, identifying and preserving samples. All core samples will be deposited in a glass sample container with a teflon cap and returned to the laboratory for analyses.

The parameters for analysis, including detection limits, frequency of sampling, container type, holding time, and analytical methods are listed in Table 12A-1. The sample will be iced upon collection and delivered to the analytical laboratory where it will be refrigerated, if necessary, before analysis.

A Chain-of-Custody Form shall be required whenever a sample is collected for analysis; sampling protocol shall require sampling personnel to complete all required field data sheets. Copies of these laboratory sheets shall be retained at the facility.

The Chain-of-Custody Form shall accompany the samples and be signed and dated, by facility personnel, at the time the samples are released; the individual accepting the samples shall sign and date the same form acknowledging receipt of the samples.

Three laboratories have been selected by Ford to provide laboratory analyses. QA/QC plans from these laboratories are included in the attachments to Section 11, Environmental Monitoring.

TABLE 12A-1

SOIL MONITORING PARAMETERS AND METHODS

Parameter	Analytical Method[1]	Estimated Detection Limit	Container & Preservative	Holding Time
Arsenic	7061	(GFAA) 0.5 mg/kg	P, G, R	6 months
Barium	6010	(ICP) 1 mg/kg	P, G, R	6 months
Cadmium	6010	(ICP) 0.5 mg/kg	P, G, R	6 months
Calcium	7140	(AA) 50 mg/kg	P, G, R	6 months
Chromium	6010	(ICP) 2.5 mg/kg	P, G, R	6 months
Copper	6010	(ICP) 1 mg/kg	P, G, R	6 months
Iron	6010	(ICP) 2.5 mg/kg	P, G, R	6 months
Lead	6010	(ICP) 20 mg/kg	P, G, R	6 months
Mercury	7470	(CVAA) 0.02 - 0.03	P, G, R	28 days
Nickel	6010	(ICP) 5 mg/kg	P, G, R	6 months
Selenium	7740	(CVAA) 0.5 mg/kg	P, G, R	6 months
Silver	7761	(GFAA) 0.2 mg/kg	P, G, R	6 months
Zinc	6010	(ICP) 1 mg/kg	P, G, R	6 months
Ethylbenzene	8021	(GC) 5 µg/kg	G, T, R	E
Toluene	8021	(GC) 5 µg/kg	G, T, R	E
Xylene	8021	(GC) 3 µg/kg	G, T, R	E
1,1-Dichloroethane	8021	(GC) 500 µg/kg	G, T, R	E
1,2-Dichlorobenzene	8021	(GC) 500 µg/kg	G, T, R	E
Naphthalene	8021	(GC) 10 µg/kg	G, T, R	E
Phenol	8040	(GC) 10 µg/kg	G, T, R	E
Cyanide (Total)	9012	1 mg/kg	P, G, R	7 days

Notes:

[1] "Test Methods for Evaluating Solid Waste" SW-846, Third Edition
P: Plastic
G: Glass
R: Refrigeration
E: 7 days to extraction and 40 days from collection

ATTACHMENT 12B

FINANCIAL ASSURANCE

CELL II CLOSURE COST ESTIMATE
JUNE, 1995

The closure cost estimate is calculated to cover maximum potential costs by a third party. Closure costs were originally developed in June of 1987 and subsequently updated on an annual basis to account for inflation. Cell II closure costs are being recalculated due to cap design modifications.

1. **Application of Bedding Layer**

   Description: Install 15 acres of bedding approximately 1 foot deep (24,200 cubic yards) of ML, CL-ML, or CL material.

   Material Purchase* -0-

   Remove material from stockpile, place, and compact - 24,200 yd^3 @ \$3.00/yd^3 \$72,600

   * Material is already stockpiled on site.

2. **Compacted Clay Layer**

   Description: Provide and install 15 acres of clay 3 feet deep (72,600 cubic yards) of ML, CL-ML, or CL material.

   Material Purchase - 72,600 cubic yards @ \$6.00/yd^3 \$435,600

   Clay placement and compaction - 72,600 yd^3 @ \$2.05/yd^3 \$148,830

3. **20 mil PVC Cover**

   Description: Provide and install 15 acres (653,400 ft^2) of PVC liner

   Material and installation - 653,400 ft^2 @ \$0.25/ft^2 \$163,350

4. **Drainage Fabric**

   Description: Provide and install 15 acres of geonet and geotextile filter fabric

   Material and installation - 653,400 ft^2 @ \$0.35/ft^2 \$228,690

RECORD COPY
SCHEDULE NO.
RETAIN UNTIL 2/95

Environmental and Safety Engineering Staff
Ford Motor Company

Suite 608
15201 Century Drive
Dearborn, Michigan 48120

February 27, 1992

Mary Villarreal
U.S. EPA Region V
P.O. Box A 3587
Chicago, IL 60690

Subject: 1991 Hazardous Waste Report
Ford Allen Park Clay Mine Landfill - U.S. EPA ID# MID980568711

Dear Ms. Villarreal,

Enclosed are the following:

- Completed 1991 RCRA Hazardous Waste Report for the subject facility as required by 40 CFR §264.75.
- Current closure and post closure cost estimates, under 40 CFR §264.142 and §264.144 respectively, in accordance with 40 CFR §264.75(g).

Should you have any questions, please call me at 313/322-0701.

Sincerely,

David A. O'Connor
Facility Environmental Engr.

Enclosures

OMB#: 2050-0024 Expires 9.30.92

U.S. ENVIRONMENTAL PROTECTION AGENCY

1991 Hazardous Waste Report

FORM **IC**

IDENTIFICATION AND CERTIFICATION

INSTRUCTIONS: Read the detailed instructions beginning on page 6 of the 1991 Hazardous Waste Report booklet before completing this form.

SEC. I Site name and location address. Complete items A through H. Check the box ☒ in items A, C, E, F, G, and H if same as label; if different, enter corrections. If label is absent, enter information. Instruction page 6

A. EPA ID No. Same as label ☐ or → MID 980 568 711

B. County: WAYNE

C. Site/company name Same as label ☐ or → FORD MOTOR COMPANY ALLEN PARK CLAY MINE LANDFILL

D. Has the site name associated with this EPA ID changed since 1989? ☐ 1 Yes ☒ 2 No

E. Street name and number, if not applicable, enter industrial park, building name or other physical location description. Same as label ☐ or → 17005 OAKWOOD BOULEVARD

F. City, town, village, etc. Same as label ☐ or → ALLEN PARK

G. State Same as label ☐: MI

H. Zip Code Same as label ☐: 48101-

SEC. II Mailing address of site. Instruction page 6

A. Is the mailing address the same as the location address? ☐ 1 Yes (SKIP TO SEC. III) ☒ 2 No (GO TO BOX B)

B. Number and street name of mailing address: 15201 CENTURY DR. SUITE 608

C. City, town, village, etc.: DEARBORN

D. State: MI

E. Zip Code: 48120-

SEC. III Name, title, and telephone number of the person who should be contacted if questions arise regarding this repon. Instruction page 6

A. Please print Last name	First name	M.I.	B. Title	C. Telephone
O'CONNOR	DAVID	A.	FACILITY ENVIRONMENTAL ENGINEER	313 322-0701 Extension N/A

SEC. IV Enter the Standard Industrial Classification (SIC) Code that describes the principal products, group of products, produced or distributed, or the services rendered at the site's physical location. Enter more than one SIC Code only if no one industry description includes the combined activities of the site. Instruction page 7

A.	B.	C.	D.
4953	4952	N/A	N/A

SEC. V "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties under Section 3008 of the Resource Conservation and Recovery Act for submitting false information, including the possibility of fine and imprisonment for knowing violations."

A. Please print Last name	First name	M.I.	B. Title
AMBER	JEROME	S	MNG, INDUSTRIAL WASTE AND TOXIC/HAZARDOUS-SUBSTANCES

C. Signature: Jerome S. Amber

D. Date of signature: 02 (MO.) 28 (DAY) 92 (YR)

FORM IC

Sec. VI - Generator Status

EPA ID NO. MID 980 563 711

A. 1991 RCRA generator status
Instruction page 7
(CHECK ONE BOX BELOW)

- ☐ 1 LQG
- ☐ 2 SQG
- ☐ 3 CESQG

(SKIP TO SEC. VII)

- ☒ 4 Non generator (CONTINUE TO BOX B)

B. Reason for not generating
Page 9
(CHECK ALL THAT APPLY)

- ☐ 1 Never generated
- ☐ 2 Out of business
- ☒ 3 Only excluded or delisted waste
- ☐ 4 Only non-hazardous waste
- ☒ 5 Periodic or occasional generator
- ☐ 6 Waste minimization activity
- ☐ 7 Other (SPECIFY COMMENTS IN BOX BELOW)

Sec. VII - On-Site Waste Management Status

A. RCRA permitted or interim status storage
Instruction page 10
1

B. RCRA permitted or interim status treatment, disposal, or recycling
Page 10
2

C. RCRA-exempt treatment, disposal, or recycling
Page 11
1

Sec. VIII - Waste Minimization Activity during 1990 or 1991

A. Did this site begin or expand a source reduction activity during 1990 or 1991?
Instruction page 11

- ☐ 1 Yes
- ☒ 2 No

B. Did this site begin or expand a recycling activity during 1990 or 1991?
Page 12

- ☐ 1 Yes
- ☒ 2 No

C. Did this site systematically investigate opportunities for source reduction or recycling during 1990 or 1991?
Page 12

- ☐ 1 Yes
- ☒ 2 No

D. Did any of the factors listed below delay or limit this site's ability to initiate new or additional source reduction activities in 1990 or 1991?
Page 12
(CHECK YES OR NO FOR EACH ITEM)

Yes	No		
☐ 1	☒ 2	a.	Insufficient capital to install new source reduction equipment or implement new source reduction practices
☐ 1	☒ 2	b.	Lack of technical information on source reduction techniques applicable to the specific production processes
☐ 1	☒ 2	c.	Source reduction is not economically feasible: cost savings in waste management or production will not recover the capital investment
☐ 1	☒ 2	d.	Concern that product quality may decline as a result of source reduction
☐ 1	☒ 2	e.	Technical limitations of the production processes
☐ 1	☒ 2	f.	Permitting burdens
☐ 1	☒ 2	g.	Source reduction previously implemented – additional reduction does not appear to be technically feasible
☐ 1	☒ 2	h.	Source reduction previously implemented - additional reduction does not appear to be economically feasible
☐ 1	☒ 2	i.	Source reduction previously implemented - additional reduction does not appear to be feasible due to permitting requirements
☐ 1	☒ 2	j.	Other (SPECIFY COMMENTS IN BOX BELOW)

E. Did any of the factors listed below delay or limit this site's ability to initiate new or additional on-site or off-site recycling activities during 1990 or 1991?
Page 12
(CHECK YES OR NO FOR EACH ITEM)

Yes	No		
☐ 1	☒ 2	a.	Insufficient capital to install new recycling equipment or implement new recycling practice
☐ 1	☒ 2	b.	Lack of technical information on recycling techniques applicable to this site's specific production processes
☐ 1	☒ 2	c.	Recycling is not economically feasible: cost savings in waste management or production will not recover the capital investment
☐ 1	☒ 2	d.	Concern that product quality may decline as a result of recycling
☐ 1	☒ 2	e.	Requirements to manifest wastes inhibit shipments off site for recycling
☐ 1	☒ 2	f.	Financial liability provisions inhibit shipments off site for recycling
☐ 1	☒ 2	g.	Technical limitations of production processes inhibit shipments off site for recycling
☐ 1	☒ 2	h.	Technical limitations of production processes inhibit on-site recycling
☐ 1	☒ 2	i.	Permitting burdens inhibit recycling
☐ 1	☒ 2	j.	Lack of permitted off-site recycling facilities
☐ 1	☒ 2	k.	Unable to identify a market for recyclable materials
☐ 1	☒ 2	l.	Recycling previously implemented – additional recycling does not appear to be technically feasible
☐ 1	☒ 2	m.	Recycling previously implemented – additional recycling does not appear to be economically feasible
☐ 1	☒ 2	n.	Recycling previously implemented - additional recycling does not appear to be feasible due to permitting requirements
☐ 1	☒ 2	o.	Other (SPECIFY COMMENTS IN BOX BELOW)

Comments:

BEFORE COPYING FORM, ATTACH SITE IDENTIFICATION LABEL OR ENTER:

SITE NAME: FORD MOTOR COMPANY - ALLEN PARK CLAY MINE LANDFILL

EPA ID NO.: M I D 9 8 0 5 6 8 7 1 1

U.S. ENVIRONMENTAL PROTECTION AGENCY

1991 Hazardous Waste Report

FORM **PS**

WASTE TREATMENT, DISPOSAL, OR RECYCLING PROCESS SYSTEMS

INSTRUCTIONS: Read the detailed instructions beginning on page 32 of the 1991 Hazardous Waste Report booklet before completing this form.

Sec. I

A. Waste treatment, disposal or recycling system description Instruction Page 38: RCRA HAZARDOUS WASTE LANDFILL

B. System type Page 38	C. Regulatory status Page 38	D. Operational status Page 39	E. Unit types Page 39
M 1 3 2	0 1	0 4	0 7 N A

Sec. II

A. 1991 influent quantity Instruction Page 40

		UOM	Density
Total			
RCRA		☐ 1 lbs/gal ☐ 2 sg	

B. Maximum operational capacity Page 41

Total	
RCRA	

C. 1991 liquid effluent quantity Page 42

		UOM	Density
Total			
RCRA		☐ 1 lbs/gal ☐ 2 sg	

D. 1991 solid/sludge residual quantity Page 43

		UOM	Density
Total			
RCRA		☐ 1 lbs/gal 2 ☐ sg	

E. Limitations on maximum operational capacity Page 44: 1. ___ 2. ___ 3. ___

F. Commercial capacity availability code Page 44: ___

G. Percent capacity commercially available Page 45: ___ %

Sec. III

A. Planned change in maximum operational capacity Instruction Page 45

☒ 1 Yes (CONTINUE TO BOX B)

☐ 2 No (THIS FORM IS COMPLETE)

B. New maximum operational capacity Page 45

		UOM
Total	6 4 8 0 0 0 . 0	7
RCRA	6 4 8 0 0 0 . 0	

C. Planned year of change Page 46: 1 9 9 3

D. Future commercial capacity availability code Page 46: 3

E. Percent future capacity commercially available Page 46: 5 0 %

Comments: SECT III. D Commercial availability will be limited to Company affiliates and suppliers.

Intra Office

Environmental and
Safety Engineering

January 10, 1992

To: File - "Federal RCRA 1992 Financial Responsibility"

Subject: Inflation Adjustments to Closure and Post-Closure Cost Estimates

Facility: Ford Allen Park Clay Mine Landfill - U.S. EPA No. 980 568 711

	Closure Costs	Post-Closure Costs
Adjusted Cost Est. for 1991:	$ 714,127	$ 994,755
Inflation Factor for 1990:	x 1.041	x 1.041
Adjusted Cost Est. for 1992:	$ 743,407	$1,035,540

David A. O'Connor

inflatn.adj

Ford Motor Company

The American Road
P.O. Box 1899
Dearborn, Michigan 48121-1899

March 25, 1993

Director
State of Michigan
Department of Natural Resources
Hazardous Waste Management Division
P. O. Box 30028
Lansing, MI 48909

Subject: Hazardous Waste Management Financial Assurance Filings

Dear Sir:

Enclosed are the following documents required for the annual Hazardous Waste Management Financial Assurance filing:

- A letter from the Chief Financial Officer, Mr. S. A. Seneker, regarding liability and closure and post-closure care.
- A special report from the independent certified public accountant regarding the financial data contained in the Chief Financial Officer's letter.
- A copy of the Annual Report on Form 10-K for the completed fiscal year, ended December 31, 1992 is not yet available. This will be sent to you early in April 1993.

If you have any questions, or require submission of additional information, please contact our office in writing so that we may comply promptly.

Sincerely,

J. D. Upright
Corporate Insurance

Enclosures

JU032511.wp

Ford Motor Company

The American Road
P.O. Box 1899
Dearborn, Michigan 48121-1899

March 22, 1993

Director
State of Michigan
Department of Natural Resources
P. O. Box 30028
Lansing, MI 48909

Subject: Hazardous Waste Management Financial Test Requirements

I am the Chief Financial Officer of Ford Motor Company, The American Road, Dearborn, Michigan 48121-1899. This letter is in support of the firm's use of the financial test to demonstrate financial capability as specified in Part 7 of the Act 64 Administrative Rules.

1. This firm is the owner or operator of the following facilities for which financial responsibility for liability coverage is being demonstrated through the financial test specified in Part 7 of the Act 64 Administrative Rules.

   See Attachment 1

2. This firm guarantees, through the corporate guarantee specified in Part 7 of the Act 64 Administrative Rules, liability coverage for the following facilities owned or operated by its subsidiaries:

   None

3. This firm owns or operates the following facilities for which financial assurance for closure or post-closure care is demonstrated through the financial test specified in Part 7 of the Act 64 Administrative Rules. The current closure and/or post-closure cost estimates covered by the test are itemized separately for each facility:

   See Attachment 1

4. This firm guarantees, through the corporate guarantee specified in Part 7 of the Act 64 Administrative Rules, closure and post-closure care of the following facilities owned or operated by its subsidiaries. The current cost estimates for closure or post-closure care so guaranteed are itemized separately for each facility:

   None

5. In other states where EPA is not administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Part 264. The current closure and/or post-closure estimates covered by such a test are itemized separately for each facility:

See Attachment 1

6. In other states where EPA is not administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial responsibility for liability coverage for the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Part 264. The liability coverages covered by such a test are itemized separately for each facility:

See Attachment 1

7. In states where EPA is administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of the financial test specified in Subpart H of 40 CFR Part 264. The closure and/or post-closure cost estimates covered by this test are itemized separately for each facility:

None

8. In states where EPA is administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial responsibility for liability coverage for the following facilities through the use of the financial test specified in Subpart H of 40 CFR Part 264. The liability coverages covered by this test are shown for each facility:

None

9. This firm is the owner or operator of the following hazardous waste management facilities for which financial capability is not demonstrated either to EPA or a state through the financial test or any other financial assurance mechanism specified in Subpart H of 40 CFR Part 264 or equivalent or substantially equivalent state mechanisms. Both the liability coverages and current closure and/or post-closure cost estimate amounts not covered by such financial assurance are itemized separately for each facility:

None

10. This firm is the owner or operator of the following UIC facilities for which financial assurance for plugging and abandonment is required under 40 CFR Part 144. The current plugging and abandonment cost estimates as required by 40 CFR 144.62 are itemized separately for each facility:

None

This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk (*) are derived from this firm's independently audited, year-end financial statements for the latest fiscal year, ended December 31, 1992.

Alternative 2

1.	Sum of current closure and post-closure cost estimates for Michigan facilities (total of all cost estimates listed in above paragraphs 3 and 4)	$ 53,441,637
2.	Sum of current closure and post-closure cost estimates for non-Michigan facilities (total of all cost estimates listed in above paragraphs 5, 7, & 9)	$ 208,067
3.	Sum of current plugging and abandonment cost estimates for all UIC facilities for which financial assurance is required under 40 CFR Part 144 (total of paragraph 10)	$ 0
4.	Amount of annual aggregate liability coverage (maximum aggregate for facilities listed in above paragraphs 1, 2, 6, 8, and 9)	$ 10,000,000
5.	Sum of lines 1, 2, 3, and 4	$ 63,649,704
6.	Current bond rating of most recent issuance and name of rating service	A Standard & Poors
7.	Date of issuance of bond	November 1992
8.	Date of maturity of bond	November 2022
*9.	Tangible net worth	$ 6,530 million
*10.	Total assets in the U.S.	$139,243 million

*11.	Total assets in Michigan excluding the value of land used for hazardous waste disposal. 1/	$ 6,545 million
*12.	Total assets in Michigan including the value of land used for hazardous waste disposal. 1/	$ 6,548 million

		Yes	No
13.	Is line 9 at least $10 million	X	
14.	Is line 9 at least 6 times line 5?	X	
*15.	Are at least 90% of firm's assets located in the U.S.? If not, complete line 16.		X
16.	Is line 10 at least 6 times line 5?	X	
*17.	Is line 11 at least $50 million?	X	
18.	Is line 12 at least 6 times line 1?	X	

- - - - -

1/ This number represents total inventory, net; and property plant, special tools and equipment, net, in Michigan at December 31, 1991. It excludes assets of Ford Motor Credit Company, First Nationwide Bank, and other finance subsidiaries.

I hereby certify that the wording of this letter is identical to the wording in the letter specified by the Director for the financial test as such letter was specified on the date shown immediately below.

S. A. Seneker
Signature

S. A. Seneker
Name

Executive Vice President and
Chief Financial Officer
Title

3/23/93
Date

ju031012.wp

Closure and Post-Closure Cost Estimates for Company
RCRA Facilities

Facility and Address	Region	EPA I.D. No.	Liability Coverage	Closure Costs	Post-Closure Costs	Total
FORD MOTOR COMPANY						
OWNED/OPERATED FACILITIES						
Allen Park Clay Mine[a/] 17005 Oakwood Boulevard Allen Park, MI 48101	V	MID980568711	Sudden & Nonsudden	$ 773,887	$1,077,997	$ 1,851,884
Milan Plastics Plant[a/] 800 County Street Milan, MI 48160	V	MID091955476	Sudden	94,793	--	94,793
Monroe Stamping Plant[a/] 3200 E. Elm Avenue Monroe, MI 48161	V	MID005057005	Sudden & Nonsudden	50,354,600	1,140,360	51,494,960
Loral Aerospace Corp.[b/] (Lessee) Ford Road Newport Beach, CA 92663	IX	CAD041330077	Sudden	208,067	--	208,067
Ford Motor Company Total				$51,431,347	$2,218,357	$53,649,704

- - - - -

a/ Liability coverage in Michigan for sudden accidental occurrences: $2 million annual aggregate, and for nonsudden accidental occurrences: $6 million annual aggregate; total $8 million annual aggregate.

b/ Liability coverage in California for sudden accidental occurrences: $2 million annual aggregate per facility; total $2 million annual aggregate.

Coopers
&Lybrand

certified public accountants

Ford Motor Company
Dearborn, Michigan

We have audited the consolidated financial statements of Ford Motor Company and Subsidiaries for the years ended December 31, 1992 and 1991, and have issued our report thereon dated February 8, 1993. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

Mr. S. A. Seneker, Ford Motor Company Executive Vice President and Chief Financial Officer, stated in a letter to the Director of the Michigan Department of Natural Resources that at December 31, 1992 consolidated tangible net worth was $6,530 million and total assets in the United States aggregated $139,243 million and that at December 31, 1991 net inventory and net land, plant, special tools and equipment of the Company's Automotive Operations in Michigan were $6,548 million. He further stated that total assets in the United States were less than 90 percent of total worldwide assets.

We have compared this data with corresponding data included in or derived from the financial statements referred to above. On the basis of this comparison, no matters came to our attention that caused us to believe that the data specified above should be adjusted.

Coopers & Lybrand
400 Renaissance Center
Detroit, Michigan 48243
March 22, 1993

ATTACHMENT 12C

ENGINEERING DESIGN CALCULATIONS FOR FINAL COVER

NEYER, TISEO & HI_
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2515 Comerica Building • Detroit, MI 48226 • (313) 965-0036

JOB Allen Park Clay Mine PROJECT NO. 84185 SHEET NO. 1/9
SUBJECT Final Cover BY KJC DATE 5/22/84
CHK. BY DRE DATE 6/15/84

FINAL COVER EVALUATION COPIED BY LES 6-27-84

SOIL EROSION

The Universal Soil Loss Equation as presented in U.S.E.P.A. SW-867, 1982;

$$A = RKLSCP$$

where:

A = average annual soil loss in tons/acre

R = rainfall/runoff erodibility factor

use R = 110 (from fig. 20 USEPA SW-867, 1982)

K = soil erodibility factor in tons/acre

use K = 0.25 silty clay cover w/little or no organic content

LS = slope length and steepness factor

maximum length north-south = 1200 ft

maximum overall grade = 4% so

LS = 1.1 (Table 6, USEPA SW-867, 1982)

C = cover management factor

continuous grassy cover (meadow maximum)

use C = 0.025 (Table 7, USEPA SW-867, 1982)

P = conservation practices to reduce erosion

use P = 1.0 conservative assumption; no support practices (Table 8, USEPA SW-867, 1982)

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JOB Allen Park Clay Mine PROJECT NO. 3485 SHEET NO. 2/9
SUBJECT Final Cover BY K+C DATE 5/23/84
CHK BY DRE DATE 6/15/84
COPIED BY LJS 6-27-84

$A = 110 (0.25 \text{ tons/acre})(1.1)(0.025)(1.0)$

$A = 0.76$ tons/acre

Erosion loss is less than 1.0 ton per acre per year.

FUNCTION OF DRAINAGE BLANKET

- to transmit water percolating through the compacted clayey soil layer off the cell.

I. Total Percolation through silty clay layer

Assume saturation of clay with no ponding or backup within the drainage blanket

use: $q = K_c I$

where:

K_c = compacted permeability of silty clay cover layer

I = hydraulic gradient

use: $K_c = 5.8 \times 10^{-8}$ cm/sec - permeability of 2 remolded gray silty clay samples from site compacted 90% or more.

see: Hydrogeological Report - Allen Park Clay Mine MTE, 11/24/81

$I = 1.0$ because clay is assumed saturated without ponding on top of cap.

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JOB Allen Park Clay Mine PROJECT NO. 84185 SHEET NO. 8/9
SUBJECT Final Cover BY RJG DATE 5/22/84
CHK BY WKS DATE 6/15/84
COPIED BY LTS 6-27-84

$$q = K_c I = 5.8 \times 10^{-8} \frac{cm}{sec} (1.0) \left(\frac{in}{2.54 cm}\right)\left(\frac{3600 sec}{hr}\right)$$

$$= 8.2 \times 10^{-5} in/hr$$

maximum percolation for 1200' strip (1 ft wide) through the clay ⇒

$$8.2 \times 10^{-5} in/hr \left(\frac{14.965 gpd/ft^2}{in/hr}\right) = 1.23 \times 10^{-3} gpd/ft^2$$

so $1.23 \times 10^{-3} gpd/ft^2$ (1200 ft) = 1.47 gpd/ft of width

II. Flow through sand Blanket Drain

sand in blanket drain is Class II

according to: MDOT (1984)

Class II Fine Aggregate is primarily a fine sand with a maximum of 7% silt or clay-sized material

use $K = 1.0 \times 10^{-2}$ cm/sec (Matrecon, 1980)

Assume minimum slope is 3%
with slope length = 1200 ft

If layer is flowing full with no excess head at base of clay:

$$Q = KIA$$

use unit area, i.e. 1 ft thick, 1 ft wide

so:

$$Q = 1 \times 10^{-2} \frac{cm}{sec} \left(\frac{2.12 \times 10^4 gpd/ft^2}{1 cm/sec}\right)(0.03 ft/ft)(1 ft)$$

$Q = 6.4$ gpd/ft of width

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JOB Allen Park Clay Mine — PROJECT NO. 84185 — SHEET NO. 9
SUBJECT Final Cover — BY RLG — DATE 5/20/84
CHK. BY WJEP — DATE 6/15/84
COPIED BY LJS — 6-27-84

so DRAINAGE BLANKET CAPACITY (6.4 gpd/ft) exceeds estimated inflow (1.5 gpd/ft) along a 1ft wide strip by ≈ 4 times.

III Edge Drain Capacity

Edge drain is 4" ø @ 0.1% slope (min)

for maximum flow capacity - use Hazen Williams eqn.

$$V = 1.318\, C_{hw}\, R_h^{0.63}\, S^{0.54}$$

& $Q = VA$ continuity eqn.

where:

Q = flow, ft^3/sec

V = velocity, ft/sec

C_{hw} = roughness coefficient

use $C_{hw} = 80$ (conservative)

R_h = hydraulic radius = pipe dia./4 (if flowing full)

$R_h = 4"/4 = 0.083$ ft

S = slope of pipe

assume ≥ 0.001 = 0.1% slope

A = area, ft^2

$= (0.333\,ft)^2 \cdot \frac{\pi}{4} = 0.087\ ft^2$

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JOB Allen Park Clay Mine PROJECT NO. 5185 SHEET NO. 5 9
SUBJECT Final Cover BY RJC DATE 5/20/84
CHK BY WRT DATE 6/15/84

COPIED BY LJS 6-27-84

$$V = 1.318\,(80)\,(0.083)^{0.63}\,(0.001)^{0.54}$$
$$= 1.318\,(80)\,(0.21)\,(0.024)$$
$$= 0.53 \text{ ft/sec}$$

$$Q = (0.53 \text{ ft/sec})(0.087 \text{ ft}^2)$$
$$= 0.046 \text{ ft}^3/\text{sec} = 29700 \text{ gal/day}$$

Maximum infiltration through clay cover = 1.23×10^{-3} gpd/ft^2

proposed hazardous waste cover area
= 670 ft × 1200 ft = 804,000 ft^2

$Q_{infiltrate} = 1.23 \times 10^{-3}$ gpd/ft^2 × 804,000 ft^2 = 989 gpd

Therefore drain capacity exceeds expected flow by over one order of magnitude. A single drain will be sufficient. However, additional drain pipes and 3 outlets are included for redundancy.

IV Filter Requirements between pipe and Class II sand.

Use geotextile filter. See design of leachate collection system.

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JOB Allen Park Clay Mine PROJECT NO. 84185 SHEET NO. 6/9
SUBJECT Final Cover BY RIC DATE 6/11/84
CHK BY WRB DATE 6/15/84
COPIED BY LTS 6-27-84

V Open Area on Perforated Pipe

Assume maximum inflow to perimeter drain is 1.47 gpd/ft (with S.F. = 2 — use 3.0 gpd/ft)

Limit Entrance Velocity to 0.1 ft/sec (U.S Army TM 5-818-5, 1971)

$$\frac{3.0 \text{ gpd/ft}}{0.1 \text{ ft/sec}} = 4.6 \times 10^{-5} \text{ ft}^3/\text{ft}$$

OR $0.007 \text{ in}^2/\text{ft}$

Required open area on perforated pipe is $0.007 \text{ in}^2/\text{ft}$ to handle maximum infiltration. Actual open area will be at least $0.25 \text{ in}^2/\text{ft}$. Will use 1/4" ø holes.

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JOB Allen Park Clay Mine PROJECT NO. 84185 SHEET NO. 2/9
SUBJECT Final Cover Evaluation BY WKR DATE 6/21/84
CHK. BY LTS DATE 6/27/84

Settlement

Primary consolidation of the waste will occur very rapidly. Sowers (1973) indicates this will be within 1 month of loading. Construction of the final cover can be expected to be completed within 9 months of receipt of last wastes (40 CFR 264.113). The cell will be filled slowly over an extensive period. For analysis, we will assume that all primary consolidation and the first 5 years of secondary compression will be complete prior to cover construction.

Assume the moderately compacted industrial wastes will possess a void ratio of approximately 2.0

$\alpha_{secondary} \approx .09\, e_o = .09(2) = 0.18 \rightarrow$ use 0.2 (Sowers, 1973)

This is for conditions unfavorable to decomposition because no general refuse is in this cell.

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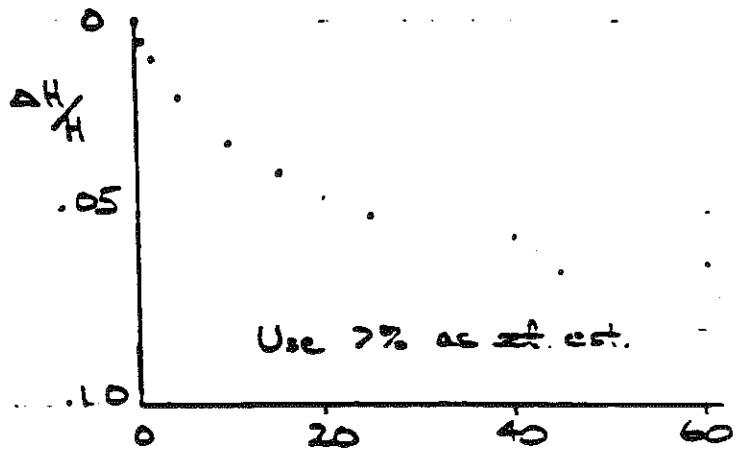
JOB Allen Park Clay Mine PROJECT NO. 84185 SHEET NO. 8/9
SUBJECT Final Cover Evaluation BY WDH DATE 6/21/84
CHK. BY LJS DATE 6/29/84

$$\frac{\Delta H}{H} = \frac{\alpha \log (t_2/t_1)}{1+e} \qquad t_1 \approx 5 \text{ yrs}$$

t_2	$\Delta H/H$
6	.005
7	.010
10	.020
15	.032
20	.040
30	.052
50	.067



Estimate of post-cover settlement → $\Delta H/H \approx 7\%$

Post-cover settlement estimates:

Max fill depth occurs near 6800 E

Surface grade = 634 Base grade = 564

(634-564) - 5 ft (cover) = 65 feet of fill

65 x .07 = 4.55 ft → Max est. sett. = 5 ft.

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JOB Allen Park Clay Mine PROJECT NO. 84185 SHEET NO. 9/9
SUBJECT Final Cover Evaluation BY LSS DATE 6-22-84
CHK. BY WRP DATE 6/28/84

References

Lutton, R.J., Evaluating Cover Systems for Solid and Hazardous Waste, U.S. EPA SW-867, 1980, 57 pp.

Matrecon, Inc., Lining of Waste Impoundment and Disposal Facilities, SW-870, U.S. EPA, 1980, 385 pp.

Michigan Testing Engineers, Inc., "Hydrogeological Study; Allen Park Clay Mine, Allen Park, Michigan", 1981, 41 pp. plus Appendices.

U.S. Department of the Army, Dewatering and Groundwater Control for Deep Excavations, TM 5-818-5, 1971, 187 pp.

NEYER, TISEO & HINDO, LTD.
Consulting Engineers and Geologists
38955 Hills Tech Drive, Farmington Hills, Michigan 48018 313 553-6300

March 2, 1987
Project No. 84185 OW

Mr. David S. Miller
Mining Properties Department
Rouge Steel Company
3001 Miller Road
Dearborn, Michigan 48121

RE: Resolution of MDNR concern over FML integrity

Dear Mr. Miller:

As you requested, we have attempted to resolve the concerns expressed by the Michigan Department of Natural Resources (MDNR) regarding the potential for puncture of the 20 mil flexible membrane PVC liner (FML) selected for use in the Cell I cover system at the Allen Park Clay Mine. MDNR expressed these concerns following their review of the Partial Closure Plan for Cell I, dated January 10, 1986, and design plans for Cell I, dated January 27,. 1986. The partial Closure Plan and design plans have been updated; the latest Partial Closure Plan is dated June 2, 1986 and is accompanied by a revised set of design plans. The final cover system consists of a one-foot thick subbase of silt, clayey-silt or silty-clay, a 20-mil unreinforced PVC synthetic liner, a one-foot thick protective granular blanket of Class II Material, and a top layer of compacted clay.

In a meeting on March 24, 1986 between representatives of Rouge Steel Company, Wayne Disposal, Inc., and MDNR, MDNR staff expressed concern that puncture of the synthetic liner during the placement of the granular blanket might occur. We attempted to respond to this concern in a letter, dated May 8, 1986, which included a reference to construction procedures detailed in the Partial Closure Plan on how puncture of the FML will be avoided during placement of the granular blanket as well as a discussion of projected liner stresses.

Recently, we have discussed this latter response with Mr. Terry McNeill of MDNR through telephone conversations. Specific questions focused on the rationale NTH used to compare calculated liner stress with the modulus at 100 percent elongation and methods for determining the stress imparted on the synthetic membrane.

On the basis of a re-examination of these issues, we have prepared the following written response to MDNR's questions. In this submittal, we present an evaluation of a simplified liner

puncture model and an explanation for the selection of the 100 percent elongation standard as a basis for evaluating puncture. Also included are quality control procedures contained within the revised Partial Plan Closure (dated June 2, 1986) that pertains to preparation of the clay subgrade, placement of the granular blanket and documentation of quality control.

There are apparently no generally accepted methods for analyzing the puncture conditions or stresses for a flexible membrane. However, we have attempted to present a simplified model for this purpose. The results are attached hereto. Please note that the usefulness of the attached model depends upon some important simplifying assumptions that cannot be fully verified. Therefore, the results of this analysis are useful only as a general guide. Nevertheless, they indicate that the minimal installation stresses that might result from the placement of a sand blanket by a low-ground-pressure dozer should not cause undue puncture stresses, unless some particularly sharp object was to be encountered.

Our previous submittal on this subject (May 8, 1986) presented the results of a similar modeling effort. The model attached hereto differs somewhat from the previous one. However, the conclusions of this current modeling effort are essentially the same; the estimated puncture-related stresses induced in the FML by the sand blanket and a low-ground-pressure dozer should be considerably below the stresses required to cause puncture.

In another approach, the pressure imparted on a 20-mil PVC liner from a low-ground-pressure dozer may be compared to the hydrostatic resistance standard (ASTM D-751) listed in Standard Number 54 for 20-mil PVC. This standard is suggested because the ASTM method for determining hydrostatic resistance simulates, in a reverse fashion, the condition of puncture in a synthetic liner. The hydrostatic resistance standard listed for 20-mil PVC is 60 psi. This value may be compared directly to the vertical stress imparted to the liner from overlying loads. It is approximately an order of magnitude greater than the vertical stress that we determined to act on the liner from the sand blanket and low-ground-pressure dozer.

Although these analyses were based on the ground pressure imparted by a Model D-7 LGP dozer, we would like to add that equipment often used at Allen Park Clay Mine includes an 1150 Case dozer or a D6 Komatsu dozer. The ground pressures imparted by these vehicles are lower than the pressure determined for the D-7, LGP dozer. Therefore, the stresses acting on the liner should be less than those discussed in the preceeding paragraphs.

In addition to the use of a low-ground-pressure dozer for placement of the granular blanket, additional protection of the PVC should be afforded through careful adherence to quality control specifications included in the Partial Closure Plan for Cell I, dated June 2,1986. Construction specifications for the bedding layer of the final cover of Cell I are included in Section VI.A. of the plan. The following specifications, numbered 1 through 6 in the Partial Closure Plan, pertain to the adequate preparation of the bedding layer prior to placement of the 20-mil PVC synthetic:

"1. The layer upon which the flexible membrane liner (FML) is to be placed consists of a minimum of 12 inches of silt, clayey silt, or silty clay with an ASTM method D 2487-69 classification of ML, CL-ML or CL.

2. The upper 4 inches of the layer must not contain particles larger than 1 inch in diameter.

3. The surface of the layer must be rolled with a smooth steel drum or pneumatic roller so as to be free of irregularities, loose earth, and abrupt changes in grade.

4. No FML may be placed in ponded precipitation or in any area which has become softened by precipitation to unconfined compressive strength less than 0.5 ton per square foot. (50 KPa)

5. The FML installer must provide written certification as to the acceptability of the surface preparation of the layer prior to each day's installation of FML.

6. Ford must make provisions for material, personnel, and equipment necessary to maintain an acceptable surface of the bedding layer for FML installation."

Requirements for documentation of related FML construction procedures are contained in Subsection VI.B.4.5 of the Partial Closure Plan. Subsection VI.B.4.5.2.6 states the following:

> "Ford must record daily all activities of the FML installation, which shall include but not be limited to: Receipt of the written daily acceptance of surface preparation from the FML Installer ..."

Furthermore, Section VI.C details how the granular blanket will be placed so as to avoid damage to the FML. Subsections 4 through 7 state the following:

"4. The granular material comprising the layer must be placed on the FML in a manner that does not damage it or the drainage pipe system. Sand bedding placed around the drainage pipe will spread the load of the pipe dissipating stress to the FML.

5. Initial granular material placement must be done by placing the material at the toe of the lined slope and pushing the material up the side slope with track mounted vehicles.

6. The full design thickness of the granular material layer must be maintained when spreading the material and for any construction traffic on the layer.

7. Ford must obtain direct layer thickness measurements at a rate of at least once per every half-acre to verify conformance with design requirements."

Finally, Section VII of the Partial Closure Plan contains provisions for construction quality assurance during the placement of the liner. As stated under Section VII, Construction Quality Assurance, "The independent registered professional engineer will prepare a summary report detailing construction activities, observations, test data, construction problems encountered and corrective measures taken, deviations from design or material specifications and as-built drawings."

As stated previously, a generally accepted approach to analyzing FML puncture stresses is not yet available. However, the simplified analysis attached hereto as well as a comparison of the FML hydrostatic resistance against the imparted stresses suggest that the anticipated field conditions will not closely approach the conditions necessary to induce puncture caused by gravel or small rocks. This is where the field efforts for quality control are critical and, in fact, provide the greatest assurance that FML punctures will be avoided and not adversely affect the cover integrity.

Therefore, it is our belief that through the use of proper equipment during placement of the granular blanket and careful adherence to quality control specifications included above, the likelihood of damage to the FML during construction is minimized.

We hope that this submittal fully addresses MDNR concerns regarding this matter. If any questions develop, please do not hesitate to call.

Very truly yours,

NEYER, TISEO & HINDO, LTD.

Cynthia J. Miller

Wayne R. Bergstrom, P.E.

CJM/WRB/tt

attachments

SHEET 1 OF 6

CALCULATION COVER SHEET

PROJECT No. 841850(J) CALCULATION No. _____

PROJECT NAME APCM Cell I Cover

CALCULATION BY: WRB	CHECKED BY: CJM
DATE: 2/27/87	DATE: 3-2-87

SUBJECT FML Puncture Model

CONTENTS

APPROVED BY: _____ DATE: _____

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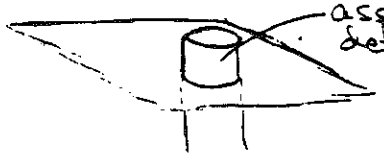
208 Carter Drive, Suite 3, West Chester, Pennsylvania 19382 215 692-4572

JOB fPCM Cell T Cover PROJECT NO. 84850W SHEET NO. 2 of 6
SUBJECT FML puncture BY WRR DATE 2/27/87
CHK. BY CJM DATE 3-2-87

IDEALIZE THE PUNCTURE MECHANISM

Prior to puncture



assume FML deforms as cylindrical object is pushed through plane of FML

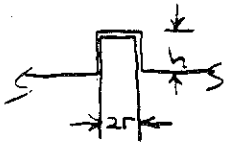
During Puncture

Area of FML prior to deformation —

$A_o = \pi r^2$ (this is area that object presses against)

↳ radius of cylindrical object

Area of FML after deformation —



$A_f = \pi r^2 + 2\pi r h$

$$\text{Strain (2-dimensional)} = (A_f - A_o)/A_o = \frac{\pi r^2 + 2\pi r h - \pi r^2}{\pi r^2}$$

$$\text{Strain (2-D)} = \frac{2\pi r h}{\pi r^2} = \frac{2h}{r}$$

Assume no strain in FML that remains planar- beyond the puncturing object

"FAILURE" CRITERION

Choose stress required to cause 100% elongation

Elongation at break for 20 Mil PVC = 300% or more

Breaking Factor >> Force to cause 100% elongation

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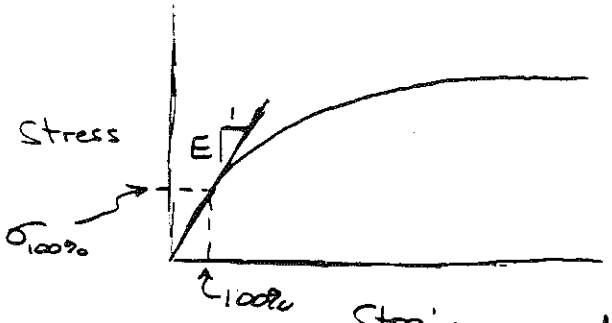
JOB APCM Cell I Closure PROJECT NO. 8418SAW SHEET NO. 3 of 6
SUBJECT FML Puncture BY WRB DATE 2/27/87
CHK. BY CJM DATE 3-2-87

Hence, choice of stress to cause 100% strain is considerably conservative.

Modulus at $\varepsilon = 100\%$ is the same as force @ $\varepsilon = 100\%$ (Standard #54) because:



Modulus typically defined as $E = \frac{\Delta\sigma}{\Delta\varepsilon}$ with units of stress (psi)

Assume this is secant modulus ie $\rightarrow E = \frac{\sigma}{\varepsilon}$

If $\varepsilon = 100\%$ or $1.00 \rightarrow E_{100\%} = \frac{\sigma_{100\%}}{1.0} = \sigma_{100\%}$

Also, if E and σ are multiplied by the material thickness, units become:

$$E\,(lb/in^2) \times t\,(in) = \text{"}Et\text{"}\ lb/in$$

This is given in Standard #54 as

Modulus (Force) at 100% elongation (lb/in width)

ie. "Et" $\approx$ "σt" at $\varepsilon = 100\%$

This is one-directional loading; our strain has been defined as 2-D (the third dimensional strain, ie. change in thickness, is ignored by the tensile testing approach). Extension of the 1-D data to a 2-D model is not strictly correct. However, given the conservative choice to use the "modulus at 100% elongation" the following is considered prudent

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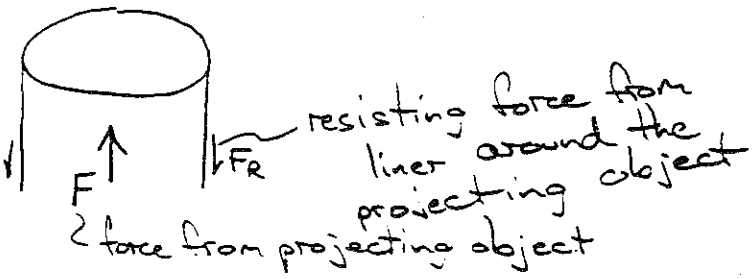
JOB APCm Cell I Closure PROJECT NO 84185aw SHEET NO. 4 of 6
SUBJECT FML Puncture BY WRB DATE 2/27/87
CHK. BY CJM DATE 3-2-87

From Standard #54, "Et"$_{100\%} \approx 18$ lb/in



F_R = "σt" $\times 2\pi r \geq F$ to prevent "failure"

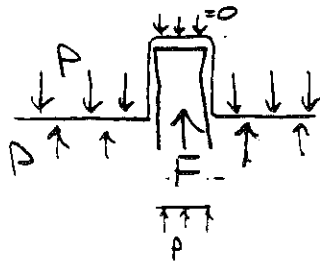
↳ at 100% elongation = "Et" ≈ 18 lb/in

$F_R = 18 \times 2\pi r = 113.1$ lb/in $(r) \geq F$

RESULTS

Want $\approx$ 100% strain for analysis

Strain $\approx \frac{2h}{r} \approx 1.00$ $\quad h \approx r/2$



Assume p (overburden pressure) acts downward on liner everywhere except over the projecting object.

$F = \pi r^2 P \leq 113.1$ (lb/in) r

$P \leq \frac{113.1 \text{ lb/in}(r)}{\pi r^2} = \frac{113.1 \text{ lb/in}}{\pi r} = \frac{36 \text{ lb/in}}{r}$

r (in)	h (in)	Pmax (psi)	dia. in
1.0	0.5	36	2.0
0.5	0.25	72	1.0
0.3	0.15	120	0.6
0.1	0.05	360	0.2

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JOB APCm Cell I Closure PROJECT NO. 84-185aw SHEET NO. 5 of 6
SUBJECT FML Puncture BY WRB DATE 2/27/87
CHK. BY CTM DATE 3-2-87

These results suggest that:

a projecting object 2" in dia. and ½" tall would cause approx. 100% 2-D strain, resulting in FML tensile stresses compatible with 100% elongation if the liner were under an overburden stress of 36 psi If stress was less, then deformation around object would be less.

It is interesting to note that the hydrostatic resistance data of standard #54 show a minimum value of 60 psi for 20 mil PVC. The test conditions are different than assumed in the foregoing simplified model but use an aperture diameter of 1.24 inches. This falls between the 1st and 2nd results shown above.

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JOB ACM Cell I Cover PROJECT NO. 84185W SHEET NO. 6 of 6
SUBJECT FML Puncture BY WRB DATE 2/27/87
CHK. BY GM DATE 3-2-87

Let us reverse this— assume P_{max}

D-7 LGP dozer → $P_{track} \approx 6.4$ psi

1 ft. of sand $\approx 125 \text{ pcf}/144 \ (1 \text{ ft}) = 0.9$ psi

$P_{max} \approx 7.3$ psi

$F_{max} = \pi r^2 P_{max} = 2\pi r \text{"}\sigma t\text{"}$ $\quad \text{"}\sigma t\text{"} = \frac{\pi r^2 P_{max}}{2\pi r} = \frac{r P_{max}}{2}$

$= 3.65 r$

r (in)	"σt"
1.0	3.65 lb/in
0.5	1.82
0.3	1.10
0.1	0.36 → these might be approx tensile "stresses" in FML due to P = 7.3 psi

Strain would be less than 100%

However, if strain is limited, the FML may "bridge" over the projections to some degree. This violates assumptions in the model so the "stresses" calculated above must be considered very rough.

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June 9, 1988
Project No. 86347 OW

Mr. David Miller
Rouge Steel Company
3001 Miller Road
Dearborn, Michigan 48121

RE: Allen Park Clay Mine
Potential cracking of Cell II Interim Cover

Dear Mr. Miller:

In accordance with your request, we have provided herein an engineering assessment report on the potential cracking of the Cell II interim cover for the limited area along the northeast, northwest and southwest boundaries of Cell II where sanitary waste will be placed above the Cell II cover.

We understand that the proposed interim cover will consist of the following materials from the top down: a 6-foot clay cover, a 1-foot layer of drainage sand, a 20-mil FML liner and a 1-foot base layer of compacted silty clay. A typical section of the composite cover is shown on Figure 1. According to MCI's design, this composite cover serves as a liner for the adjoining sanitary landfills.

As shown on MCI's drawings, this proposed interim cover will eventually be overlain by waste from the adjoining sanitary landfills along Cell II's northeast, northwest and southwest boundaries. However, for the purpose of analysis, only the profile shown on Section C-C of MCI's Drawing No. 12 is evaluated since the proposed waste deposit is thickest at this location. For easy reference, the relevant portion of this profile is shown on the attached Figure 2. From the figure, it can be seen that the thickness of the waste deposit underlying the proposed 8-foot interim cover varies from about 0 to 50 feet. Sanitary waste will be placed above the cover as shown on Figure 2 and a 2-foot thick clay cover will be placed on top of the sanitary waste.

We understand that the proposed waste in Cell II will consist of contaminated soils or fly ash which will be placed and compacted under controlled conditions. From the filling sequence, it is expected that the Cell II waste will undergo 3 stages of consolidation as follows:

1. Primary Consolidation Under Own Weight - As the in-place waste will consist of compacted soil and fly ash mostly granular in nature, primary consolidation due to its own weight is expected to be completed by the time waste placement is complete and the interim cover is placed. Hence integrity of the cover will not be affected by this consolidation process.

2. Secondary Compression - To evaluate the extent of secondary compression that could occur in the Cell II waste, a void ratio of 2 is conservatively assumed (as suggested by Sowers, 1973), for moderately compacted industrial wastes). By further assuming that 5 years will have elapsed before the interim cover is placed, a maximum settlement of about 8.9 inches is obtained for location D as shown on Figure 2. Secondary consolidation settlement values are approximately 7.4, 5.0 and 2.8 inches at points C, B and A respectively.

3. Primary Consolidation Under Weight Of Sanitary Fill - Upon placement of the sanitary fill and the final cover, further consolidation of the Cell II waste is anticipated due to the own weight of these materials. A compression index (C_c) of 0.4 was adopted following Sowers' suggestion (for wastes having low organic content) to compute this settlement. The analysis shows that maximum primary consolidation settlement occurs at point B (Figure 2) and is on the order of 9.1 inches.

Total settlement of Cell II waste at various locations along the interim cover (points A, B, C, and D) was evaluated by summing the settlements obtained from 2 and 3 above. These computations showed that maximum total settlement should be expected to take place near location B with a magnitude of about 14 inches. A plot of total settlement vs. location is presented on Figure 3. From the figure, it can be seen that the maximum differential settlement is on the order of 5.3 inches in 10 feet and is located between points A and B.

Based on our computations, differential settlement of this magnitude would theoretically cause the 6-foot clay cover to crack. Our analysis shows that the cracks will penetrate about half the clay cover thickness leaving a minimum uncracked clay thickness of 3 feet throughout the entire section (see attached calculations). The proposed interim cover should, therefore, be able to meet the minimum liner thickness requirement stipulated in the relevant sections of Act 641.

To complete our assessment, we have also evaluated the possible stretching of the FML as a result of differential settlement. Based on our computations, maximum stretching of the geomembrane will occur between Locations C and D and is expected to be about 0.4 percent. Since the elongation at yield for typical 20-mil PVC liner is on the order of 300 percent, the proposed FML in the composite cover should be able to withstand the stretching.

Finally, our calculations are attached for your information. If you have any questions please do not hesitate to contact us. Once again, we appreciate this opportunity to be of continued service to you on this project.

Very truly yours,

NEYER, TISEO & HINDO, LTD.

Benjamin Sun, P.E.

Sherif S. Afifi, P.E.

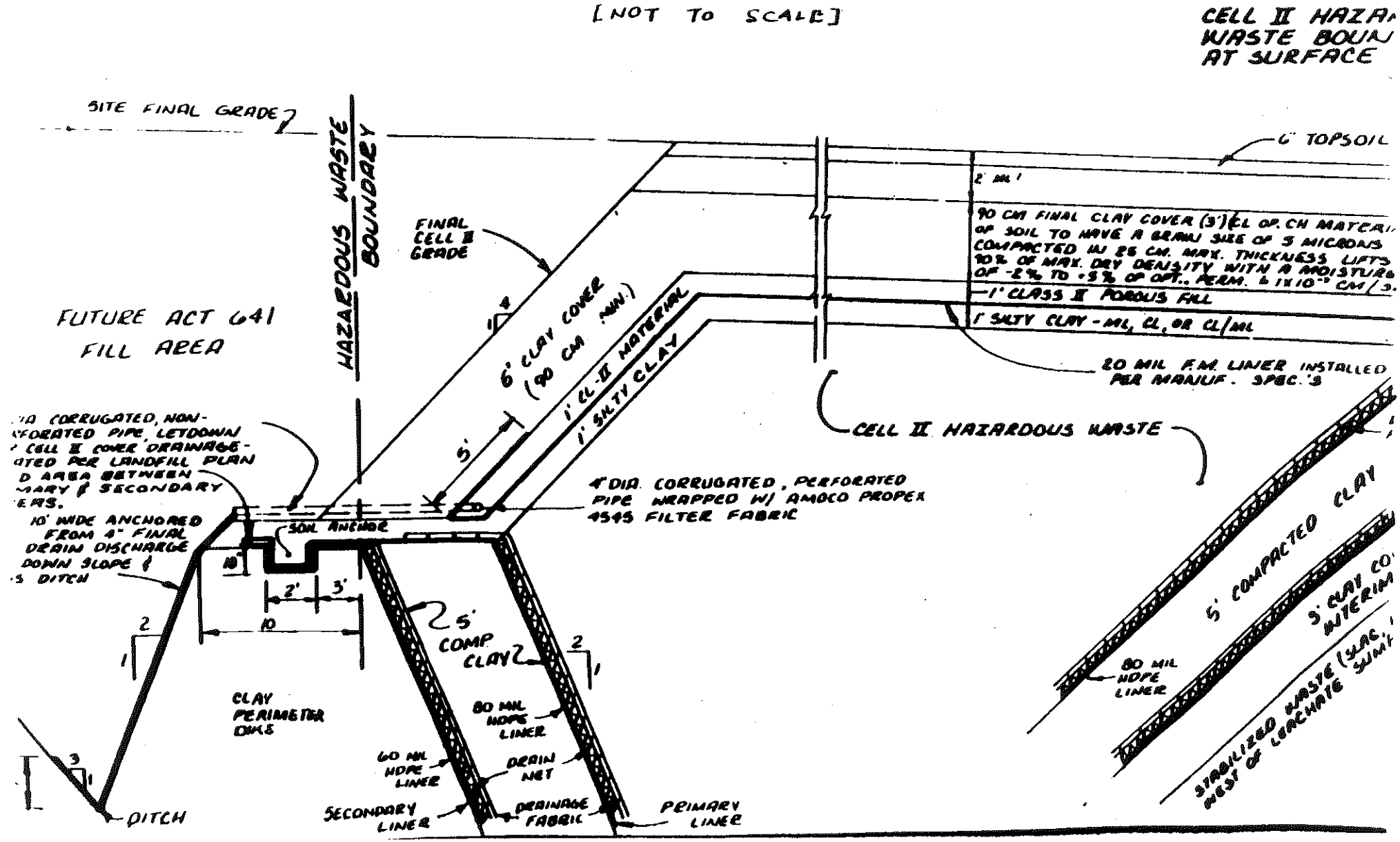
BS/SSA/tt

attachments

FIGURE 1. TYPICAL SECTION OF INTERIM CLAY COVER

(TAKEN FROM MCI's DWG No. 13 - AMENDED MAY, 88)

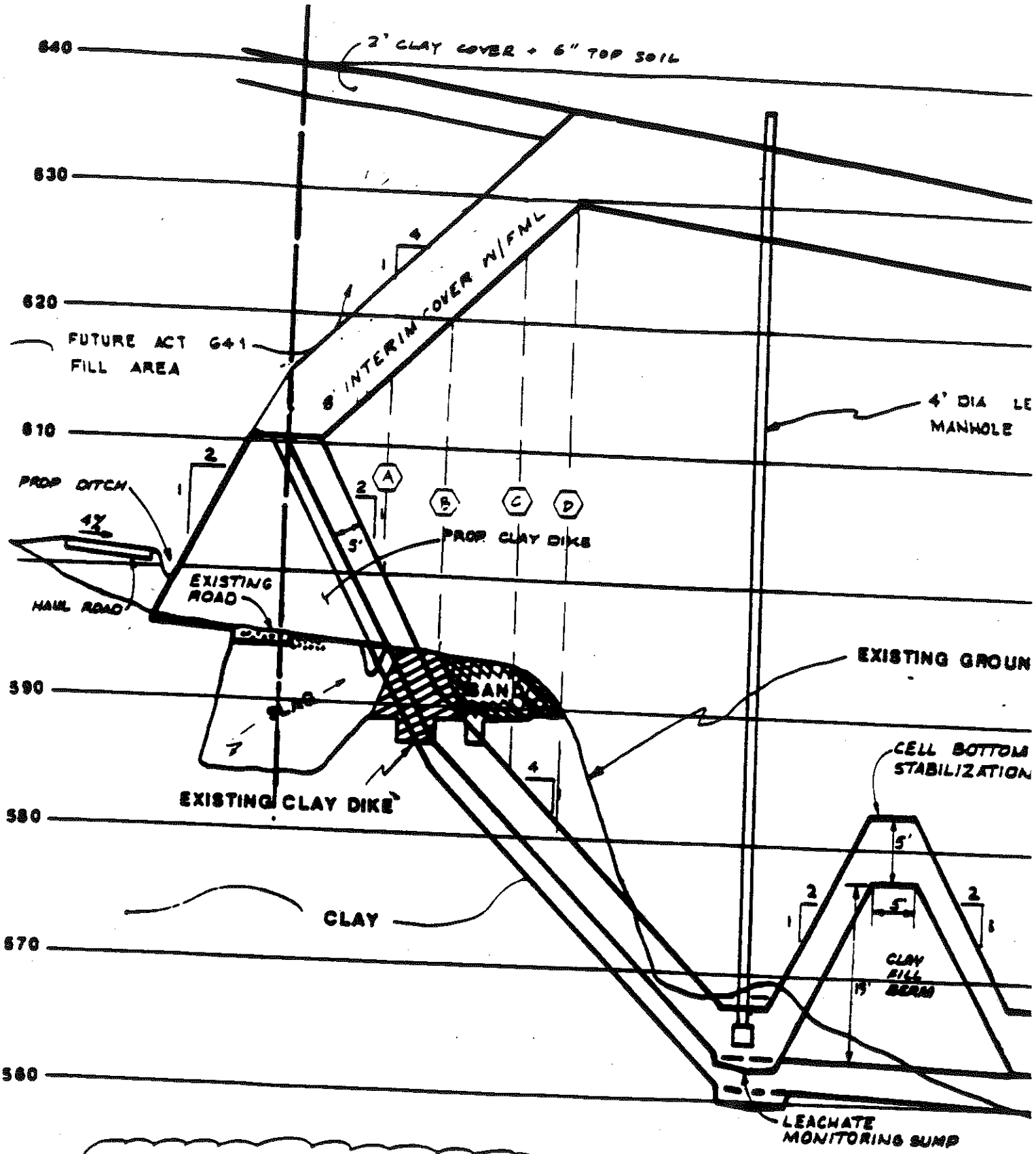
[NOT TO SCALE]



86347OW

FIGURE 2

A12-C-25

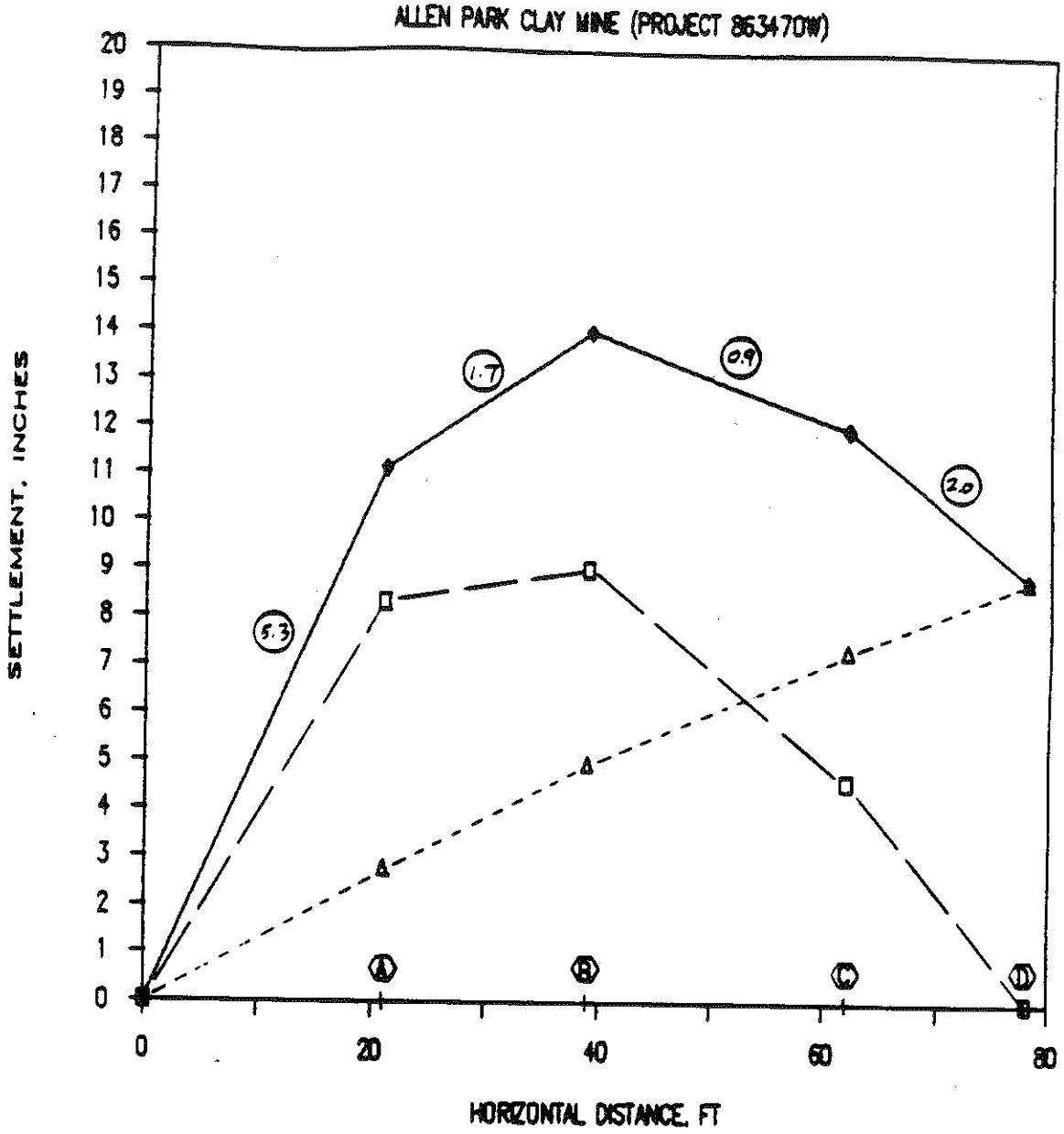


TAKEN FROM MCI'S DWG. NO. 12
(SEC. C-C) — AMENDED MAY 88

HORIZ. SCALE 1" = 40'
VERT. SCALE 1" = 10'

PLACE
AS PIT

FIGURE 3. SETTLEMENT OF CELL II WASTE



NOTES

- Total settlement
- Settlement due to weight of sanitary waste
- Settlement due to secondary compression of Cell II waste
- (5.3) Differential settlement in inches per 10 ft

Refer to Figure 2 for locations

SHEET ___ OF ___

CALCULATION COVER SHEET

PROJECT No. 86347 ON

CALCULATION No. _____

PROJECT NAME ALLEN PARK CLAY MINE

CALCULATION BY: BS	CHECKED BY: CTM
DATE: 2-24-88 (REV. 5-18-88)	DATE: 5-3-88 (REV. 5-23-88)

SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER FOR CELL II NEAR WESTERN BOUNDARY

CONTENTS

APPROVED BY: Steve Kay DATE: 5-5-88

Rev. 5-23-88

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JOB ALLEN PARK CLAY MINE PROJECT NO. 86347DW SHEET NO. 1
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TJS DATE 2-24-88
CHK. BY CTM DATE 5-3-88

NOTES:

1. THE STUDIED AREA IS NEAR 6600E GRID LINE AS SHOWN ON DWG. NO. 3 PREPARED BY MCI (DATED 7/21/87). A REPRESENTATIVE CROSS-SECTION (SEC. C-C) IS SHOWN ON SHEET 2.

2. SETTLEMENT OF WASTE IN THIS AREA CAN BE BROKEN DOWN INTO 3 COMPONENTS FOR THE PURPOSE OF ANALYSIS.

   A) PRIMARY CONSOLIDATION OF THE WASTE UNDER ITS OWN WEIGHT

   ACCORDING TO SOWERS (1973), THIS SHOULD BE COMPLETED WITHIN ONE MONTH OF LOADING. AS CONSTRUCTION OF THE INTERIM COVER CAN BE EXPECTED TO BE COMPLETED WITHIN 9 MONTHS OF RECEIPT OF LAST WASTES (40 CFR 264.113), ALL PRIMARY CONSOLIDATION SHOULD BE COMPLETED AT THE TIME THE INTERIM COVER IS CONSTRUCTED.

   B) SECONDARY COMPRESSION OF THE WASTE

   C) MECHANICAL SETTLEMENT OF THE WASTE DUE TO GAS FILL

   THE PRESENT ANALYSES PRIMARILY LOOK INTO B) & C) ABOVE, AND THE EFFECTS OF THESE SETTLEMENTS ON THE INTEGRITY OF THE INTERIM COVER

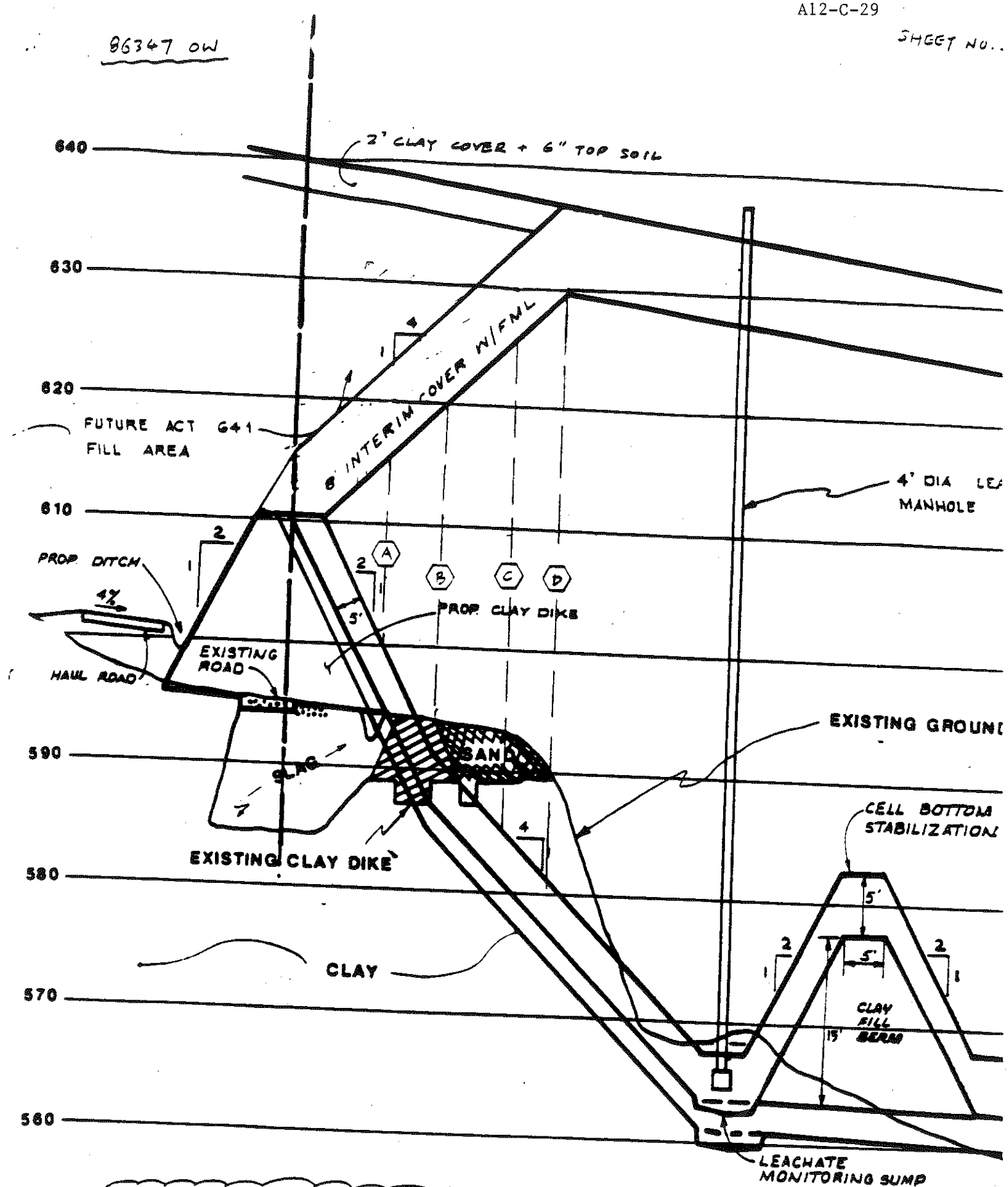
REFERENCES:

SOWERS, G.F (1973), "SETTLEMENT OF WASTE DISPOSAL FILLS", PROC., 8TH ICSMFE, VOL. 4, P. 207-210

LEONARDS, G.A. & NARAIN, J. (1963), "FLEXIBILITY OF CLAY & CRACKING OF EARTH DAMS," J. SMFD., ASCE, VOL. 89 SM5, PP 47-98

86347 OW

SHEET NO..



TAKEN FROM MCI'S DWG. NO. 12
(SEC. C-C) — AMENDED MAY 88

HORIZ. SCALE 1" = 40'
VERT. SCALE 1" = 10'

PLACE
AS PIT

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JOB ALLEN PARK CLAY MINE PROJECT NO. 86347.0W SHEET NO. 3
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TSS DATE 2-24-88
CHK. BY CTM DATE 5-3-88

SECONDARY COMPRESSION

SINCE THE CELL WILL BE FILLED SLOWLY OVER AN EXTENSIVE PERIOD, IT IS ASSUMED THAT 5 YEARS WILL ELAPSE BEFORE THE COVER IS CONSTRUCTED.

ASSUME VOID RATIO = 2 ... MODERATELY COMPACTED INDUSTRIAL WASTE

FROM SOWERS (1973),

$\alpha \simeq 0.03\, e_o$ FOR CONDITIONS UNFAVORABLE TO DECOMPOSITION

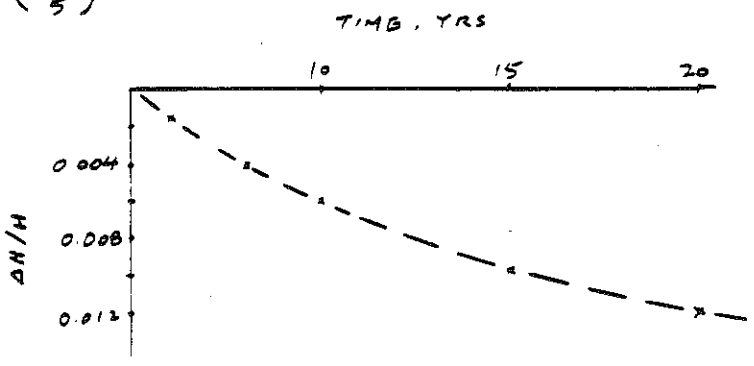
$\therefore \alpha \simeq 0.06$

FOR SECONDARY CONSOLIDATION,

$$\frac{\Delta H}{H} = \frac{\alpha \log (t_2/t_1)}{1 + e_o}$$

$$= 0.02 \log \left(\frac{t_2}{5}\right)$$

t_2	$\Delta H/H$
6	0.0016
8	0.0041
10	0.0060
15	0.0095
20	0.0120



TAKE MAX. $\frac{\Delta H}{H} = 0.015$

LOCATION	H (FT)	ΔH (FT)	ΔH (IN.)
A	15.5	0.23	2.8
B	28	0.42	5.0
C	41	0.62	7.4
D	49	0.74	8.9

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JOB ALLEN PARK CLAY MINE PROJECT NO. 86347OW SHEET NO. 4
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TKS DATE 5-18-88
CHK. BY CJM DATE 5-23-88

MECHANICAL SETTLEMENT DUE TO 641 FILL

ASSUME: γ_{WASTE} = 75 PCF (BULK); γ_{CLAY} = 130 PCF

FROM SOWERS (1973), $C_c \simeq 0.4$ FOR $e_o = 2$ ← ASSUME WELL COMPACTED
← ASSUME LOW ORGANIC CONTENT

LET H = WASTE THICKNESS IN CELL II
h = WASTE THICKNESS IN SANITARY LANDFILL
σ_o = STRESS AT MID-DEPTH OF WASTE IN CELL II (INITIAL)
σ_1 = STRESS AT MID-DEPTH OF WASTE IN CELL II (FINAL)
D = COVER THICKNESS IN SANITARY LANDFILL

$$\Delta H = \frac{C_c}{1+e_o} H \log \frac{\sigma_1}{\sigma_o}$$

	Ⓐ	Ⓑ	Ⓒ	Ⓓ
H	15.5	28	41	49
h	13	7.5	1	0
D	2.5	2.5	2.5	0
$\sigma_o = 75(\frac{H}{2}) + \overbrace{130(8)}^{1040}$	1621	2090	2578	2878
$\sigma_1 = \sigma_o + 120h + 135D$	3519	3328	3035	2878
ΔH (MECHANICAL SETTLE.)	0.70 FT (8.3 IN)	0.75FT (9.1 IN)	0.39 FT (4.7 IN)	0 FT (0 IN)
S = TOTAL SETTLEMENT (MECH. + SECOND. COMP.)	11.1 IN	14.1 IN	12.1 IN	8.9 IN

	BERM EDGE	Ⓐ	Ⓑ	Ⓒ	Ⓓ
L = HORIZ. DISTANCE (FT)		21	18	23	16
DIFF. SETTLE. → $\Delta S = \lvert S_{i+1} - S_i \rvert$ (IN.)		11.1	3	2	3.2
$\frac{\Delta S}{L}$ (IN. PER 10 FT)		5.3	1.7	0.9	2.0

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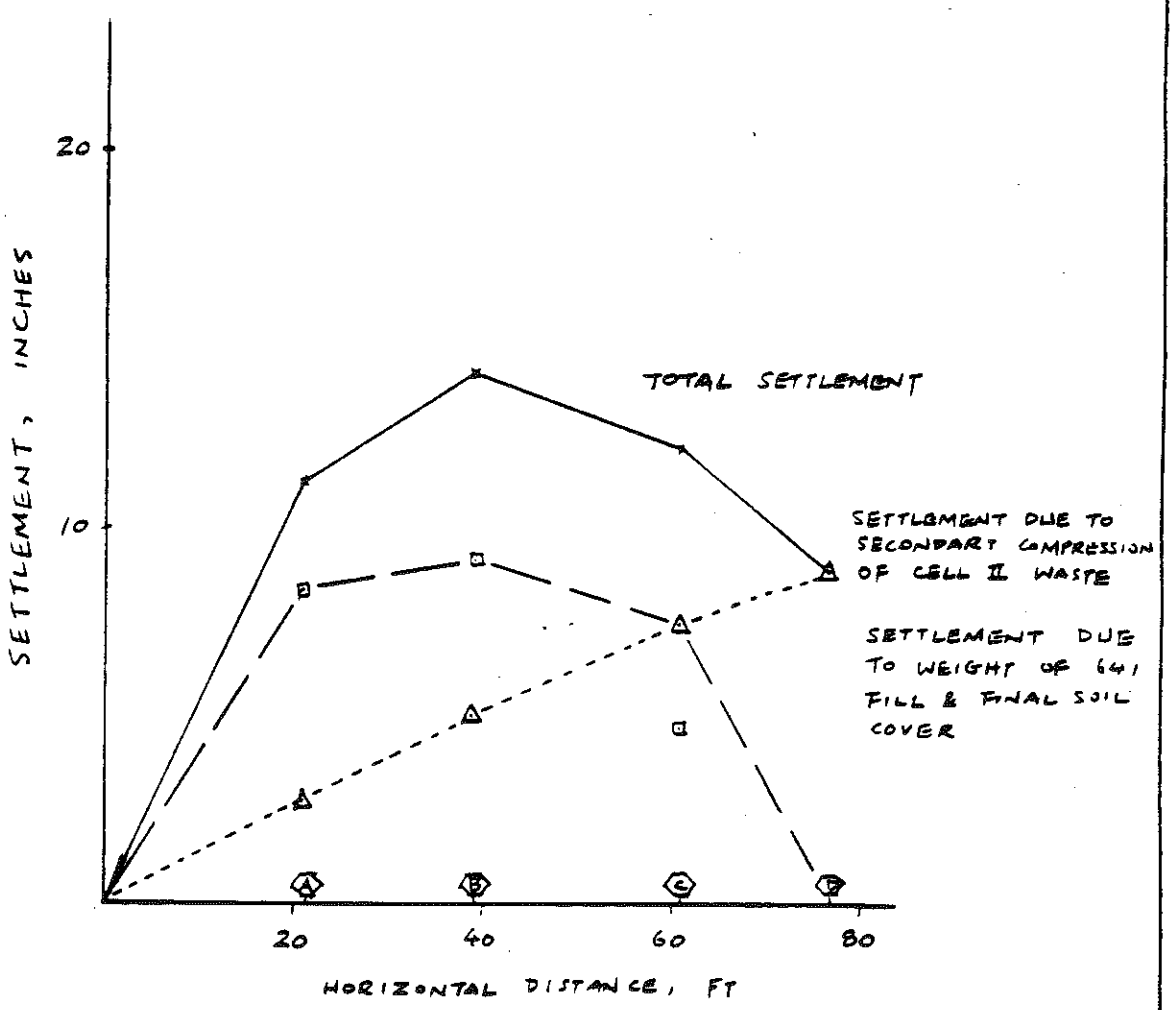
JOB ALLEN PARK CLAY MINE PROJECT NO. 863470W SHEET NO. 5
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TBS DATE 5-18-88
CHK. BY CTM DATE 5-23-88

SETTLEMENT OF CELL II WASTE BELOW INTERIM CLAY COVER



NOTES

1. REFER TO SHEET 2 FOR LOCATIONS
2. (6.7) DIFFERENTIAL SETTLEMENT IN INCHES PER 10 FT.

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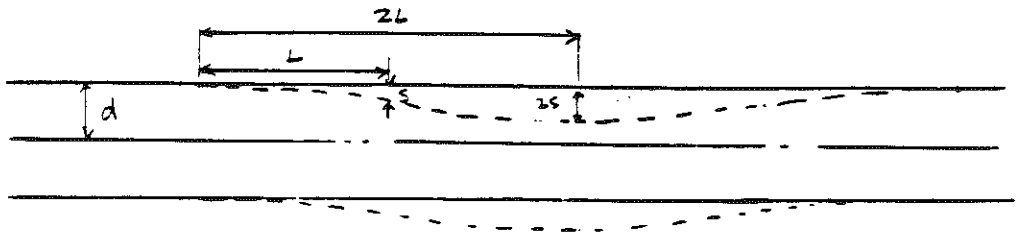
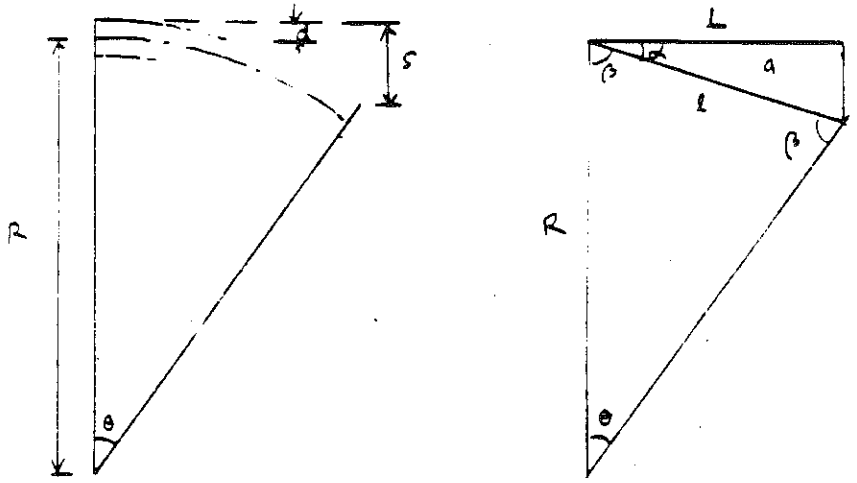
JOB ALLEN PARK CLAY MINE PROJECT NO. 86347OW SHEET NO. 6
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TBS DATE 2-24-88
CHK. BY CTM DATE 5-3-88

DETERMINE CLAY COVER THICKNESS BASED ON CRACKING CRITERION

ASSUME THAT THE CLAY COVER BEHAVES LIKE AN ELASTIC BEAM.





a = ARC LENGTH

$\theta = 180 - 2\beta$

BUT $\beta = 90 - \alpha$ $\therefore \theta = 2\alpha$

$\alpha = \tan^{-1}\frac{S}{L}$

$l = \sqrt{L^2 + S^2}$

$R = \frac{(\sin\beta)\,l}{\sin\theta} = \frac{[\sin(90-\alpha)]\sqrt{L^2+S^2}}{\sin 2\alpha}$

$a = R\,\theta\,\frac{\pi}{180}$; $a_e = (R+d)\,\theta\,\frac{\pi}{180}$

$\epsilon = \frac{a-L}{L}$; $\epsilon_{max} = \frac{a_e - L}{L}$

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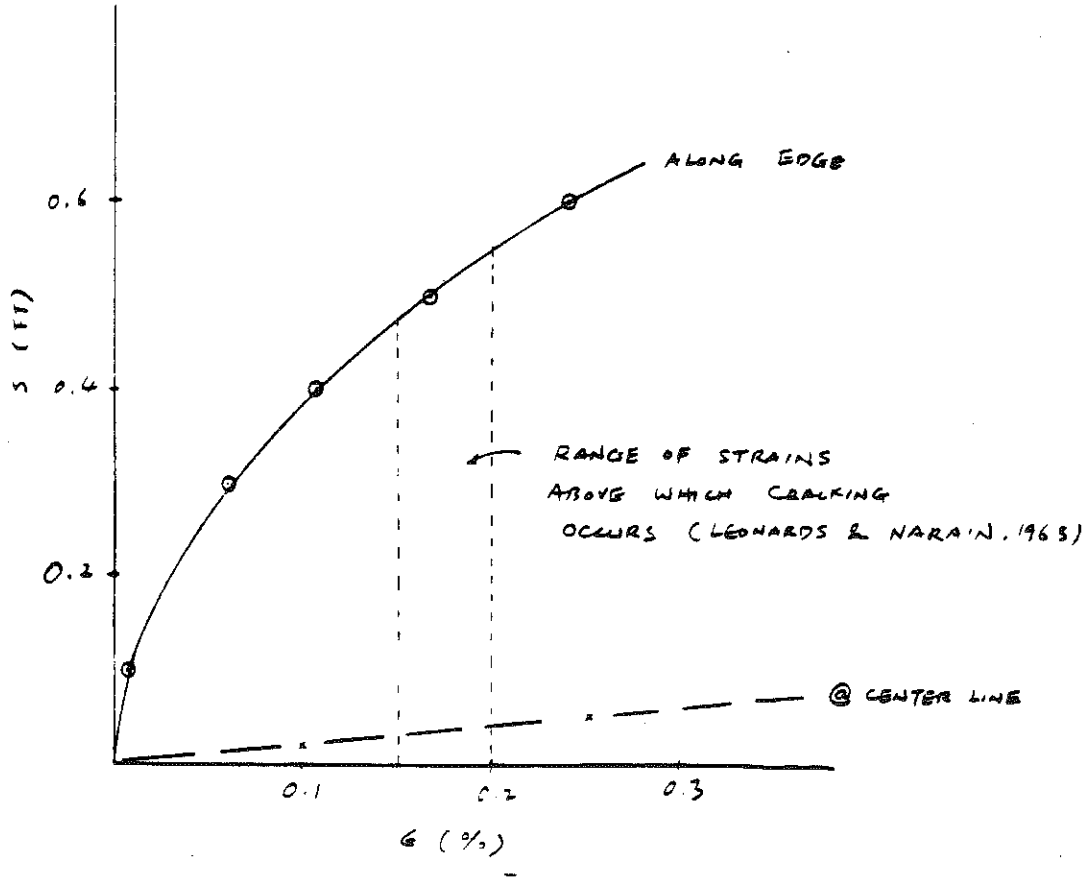
JOB ALLEN PARK CLAY MINE PROJECT NO. 86347 0W SHEET NO. 7
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TJS DATE 2-24-88
CHK. BY CJM DATE 5-3-88

CHOOSE $L = 10$ FT ; $d = 2.5$ FT

S	α	θ	R	a	ϵ	a_e	ϵ_{max}
0.02	0.115°	0.229°	7500	10,000	0.0003 %	10.010	0.100%
0.05	0.287°	0.573°	1000.0	10.0008	0.0017 %	10.025	0.252%
0.10	0.573°	1.146°	500.05	10.0007	0.0067 %	10.051	0.507 %
0.30	1.718°	3.436°	166.82	10.006	0.060 %	10.156	1.560 %
0.50	2.862°	5.725°	100.25	10.017	0.167 %	10.267	2.665 %
0.60	3.436°	6.867°	83.63	10.024	0.240 %	10.324	3.236 %
0.40	2.291°	4.581°	125.20	10.011	0.107 %	10.211	2.106 %



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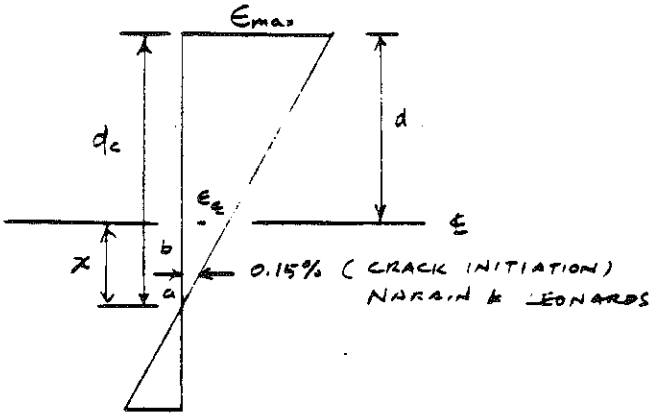
JOB ALLEN PARK CLAY MINE PROJECT NO. 86347 0W SHEET NO. 8
SUBJECT LINER CRACKING EXTENT BY TES DATE 3-3-88
CHK. BY CJM DATE 5-3-88

TRY INCREASING CLAY COVER THICKNESS:

USING AN HP-41 CV CALCULATOR, KEEPING S = 0.6 FT (IN 10 FT)

THICKNESS (FT)	d (FT)	ϵ_t	ϵ_{max}
6	3	0.240%	3.836%
7	3.5	0.240%	4.435%
8	4	0.240%	5.034%

DETERMINE CRACK DEPTH: (d_c)



$$\frac{x}{x+d} = \frac{\epsilon_t}{\epsilon_{max}} \Rightarrow \epsilon_{max} x = d\,\epsilon_t + \epsilon_t x$$

$$(\epsilon_{max} - \epsilon_t)\, x = d\,\epsilon_t$$

$$x = \frac{d\,\epsilon_t}{\epsilon_{max} - \epsilon_t} \quad \text{---} \quad (1)$$

SIMILARLY, $\frac{0.15}{\epsilon_t} = \frac{a}{x} \Rightarrow a = \frac{0.15\,x}{\epsilon_t}$ [CRACK INITIATION] ---- (2)

BUT, $b = x - a$

$\therefore\ d_c = d + x - a$

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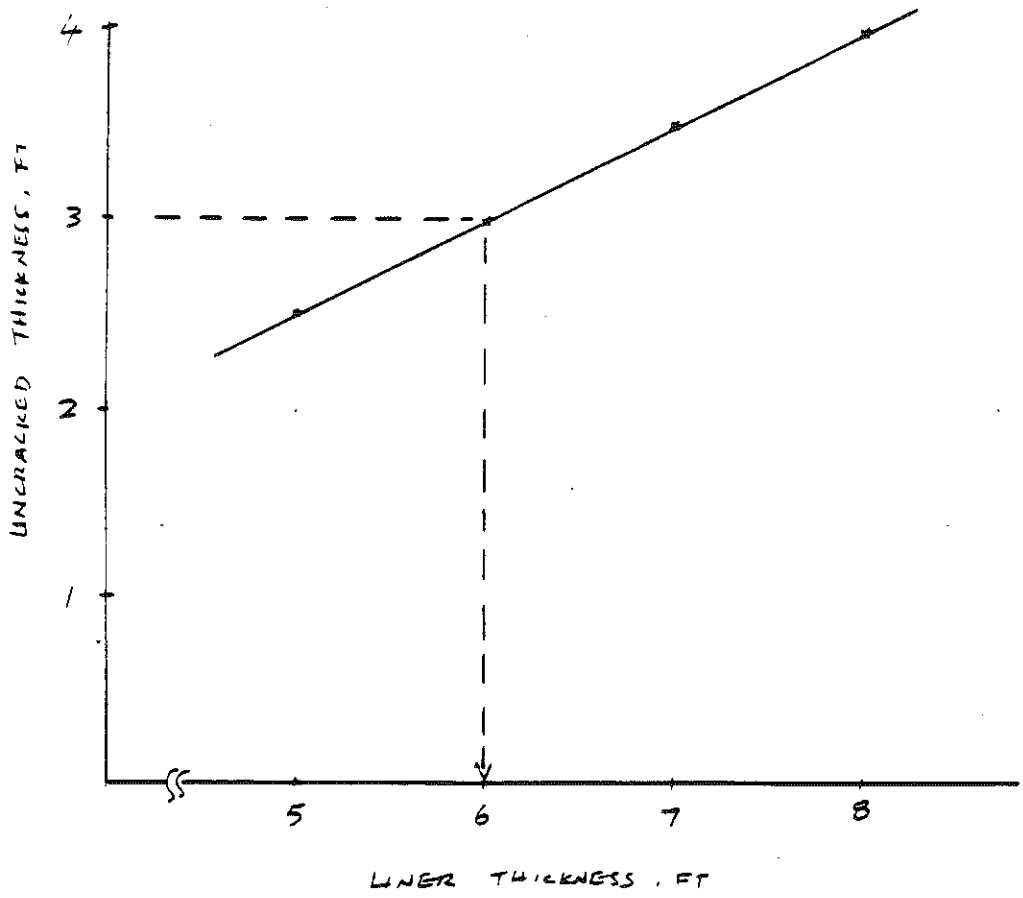
JOB ALLEN PARK CLAY MINE PROJECT NO. 86347OW SHEET NO. 9
SUBJECT LINER CRACKING EXTENT BY TJS DATE 3-3-88
CHK. BY CTM DATE 5-4-88

THICKNESS (FT)	d (FT)	ϵ_t (%)	ϵ_{MAX} (%)	x (FT)	a (FT)	d_c (FT)	$2d-d_c$ (FT)
5	2.5	0.240%	3.236%	0.200	0.125	2.575	2.425
6	3		3.836%	0.200	0.125	3.075	2.925
7	3.5		4.435%	0.200	0.125	3.575	3.425
8	4		5.034%	0.200	0.125	4.075	3.925



CONCLUSION: TO MAINTAIN A MINIMUM UNCRACKED THICKNESS OF 3 FT, A 6 FT THICK CLAY COVER IS REQUIRED

NEYER, TISEO & HINDO, LTD.

Consulting Engineers and Geologists

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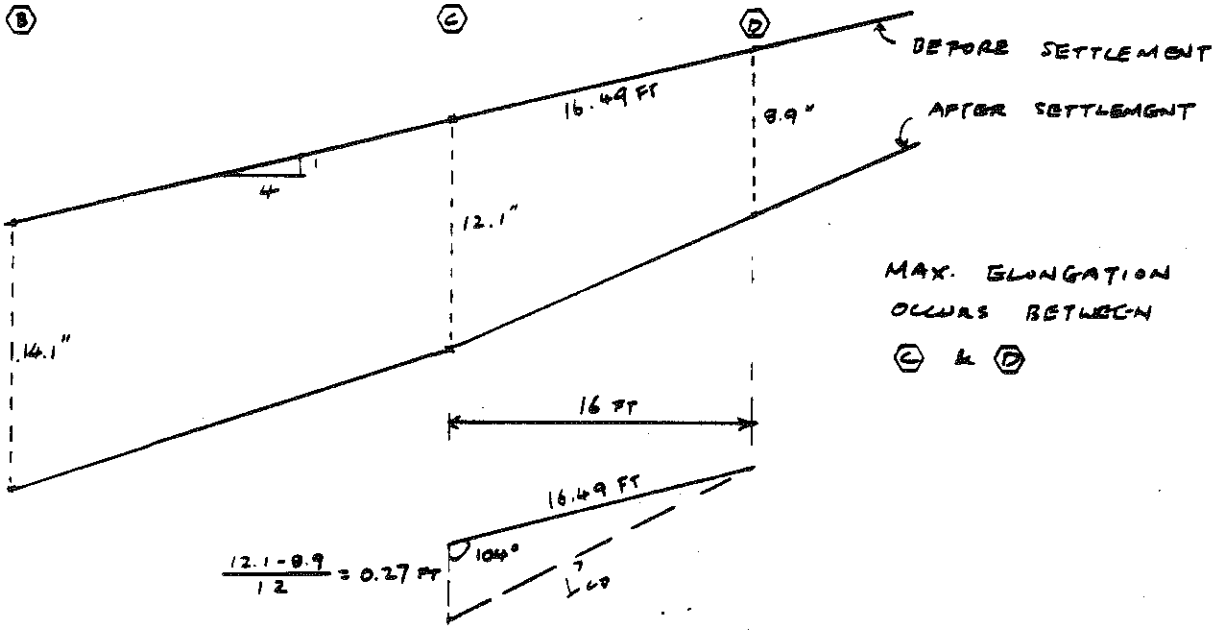
JOB ALLEN PARK CLAY MINE PROJECT NO. 86347 OW SHEET NO. 10
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY ABS DATE 5/19/88
CHK. BY CTM DATE 5-23-88

EVALUATE FML ELONGATION

FROM SHEET 4, MAXIMUM DIFFERENTIAL SETTLEMENT OCCURS BETWEEN THE BERM EDGE AND LOCATION Ⓐ. HOWEVER, THE FML WILL ONLY BE STRETCHED BETWEEN POINTS Ⓑ & Ⓓ



$$L_{CD}^2 = 0.27^2 + 16.49^2 - 2(0.27)(16.49)\cos 104^\circ = 274.12$$

$$\therefore L_{CD} = 16.56 \text{ FT}$$

$$\therefore \% \text{ ELONGATION} = \frac{16.56 - 16.49}{16.49} \times 100\%$$

$$= \underline{0.40\%}$$

FROM MANUFACTURER'S SPECIFICATION (REFER TO SHEET No. 11)

TYPICAL ELONGATION AT BREAK = 300% >> 0.40%

$\therefore$ FML ELONGATION SHOULD BE WITHIN TOLERABLE LIMIT.

PUBLISHED BY PALCO LININGS, INC.

SHEET NO

POLYVINYL CHLORIDE LINERS (PVC) (continued)

TABLE A
PVC POND LINER SPECIFICATIONS

MINIMUM MATERIAL PROPERTIES

PROPERTY	TEST METHOD	TEST VALUE 20 mils	TEST VALUE 30 mils	TEST VALUE 40 mils	TEST VALUE 50 mils
Gauge (nominal) Thickness, minimum	ASTM D792 Par. 9.1.3	19 mils	28.5 mils	38 mils	47.5 mils
Specific Gravity	ASTM D792 MTD A-1	1.24 to 1.30	1.24 to 1.30	1.24 to 1.30	1.2 to 1.3
Minimum Tensile Properties (each direction)	ASTM D882				
1. Breaking Factor (lbs/inch width)	MTD A or B one inch wide	46 lbs/in width (2300 psi)	69 lbs/in width (2300 psi)	92 lbs/in width (2300)	120 lbs/in width (2400 psi)
2. Elongation at Break (percent)	MTD A or B	300%	300%	300%	350%
3. Modulus (Force) @ 100% Elongation (lbs/inch width)	MTD A or B	18 lbs/in width (900 psi)	27 lbs/in width (900 psi)	36 lbs/in width (900 psi)	55 lbs/in width (1,100 psi)
Tear Resistance (minimum average pounds)	ASTM D1004 Die C	6 lbs (300 lbs/in)	8 lbs (267 lbs/in)	10 lbs (250 lbs/in)	14 lbs (280 lbs/in)
Low Temperature Impact (50% pass)	ASTM D1790	−15 °F	−15 °F	−20 °F	−30 °F
Dimensional Stability (each direction, percent change maximum)	ASTM D1204 212 °F 15 Min.	±5%	±5%	±5%	±5%
Water Extraction (max % wt loss)	ASTM D3083 (as modified by NSF)	0.35%	0.35%	0.35%	0.35%
Volatile Loss (max % wt loss)	ASTM D1203 MTD A	0.9%	0.7%	0.5%	0.6%
Resistance to Soil Burial (percent change maximum in original value)	ASTM D3083 (as modified by NSF)				
1. Breaking Factor		5%	5%	5%	5%
2. Elongation at Break		20%	20%	20%	20%
3. Modulus @ 100% Elongation		20%	20%	20%	20%
Hydrostatic Resistance (pounds/sq in minimum)	ASTM D751 MTD A	60 psi	82 psi	89 psi	110 psi

FACTORY SEAM REQUIREMENTS

Factory Seaming Method		——— Dielectric Fusion Weld ———			
Bonded Seam Strength (factory seam breaking factor, ppi width)	ASTM D3083 (as modified by NSF)	36.8 lbs/in width	55.2 lbs/in width	73.6 lbs/in width	96 lbs/in width
Peel Adhesion (pounds/inch minimum)	ASTM D413 (as modified by NSF)	——— 10 lbs/in Width or Film Tearing Bond ———			
Resistance to Soil Burial (percent change maximum in original value)	ASTM D3083 (as modified by NSF)				
Bonded Seam Strength		−20%	−20%	−20%	−20%
Peel Adhesion		−20%	−20%	−20%	−20%

FIELD SEAM REQUIREMENTS

Field Seaming Method		——— Bodied Solvent Weld ———			
Bonded Seam Strength (Seam Breaking Factor)	ASTM D3083 (as modified by NSF)	36.8 lbs/in Width	55.2 lbs/in Width	73.6 lbs/in Width	96 lbs/in Width

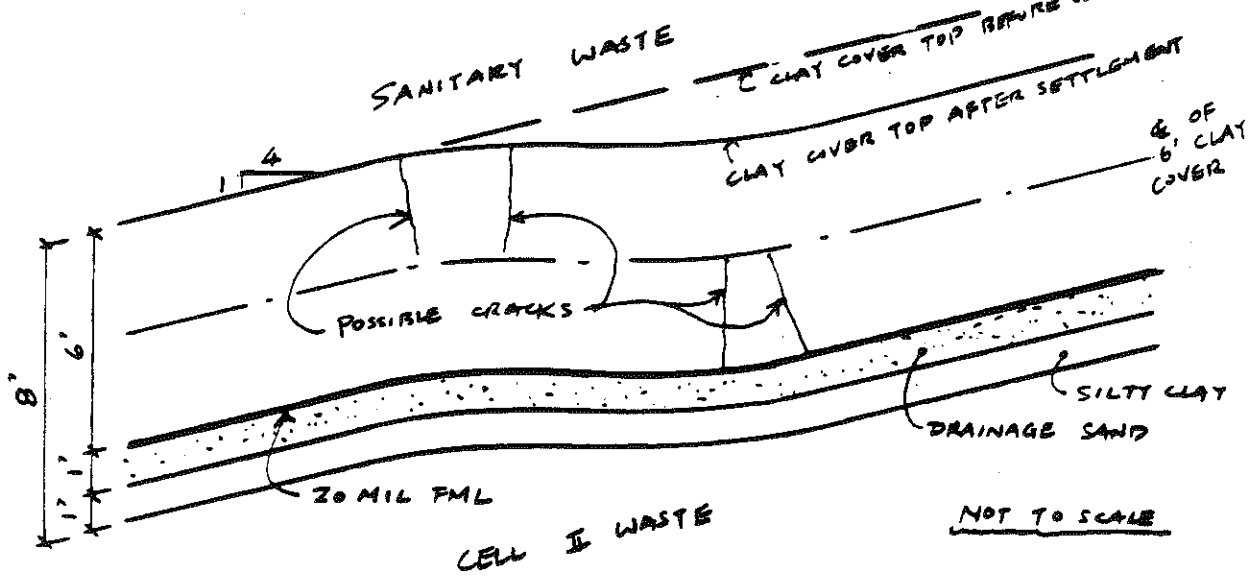
NEYER, TISEO & HINDO, LTD.
Consulting Engineers and Geologists
39955 Hills Tech Drive, Farmington Hills, Michigan 48018 313 553-8300
2053 South Dort Highway, Flint, Michigan 48503 313 232-9652
65 Cadillac Square, Suite 2223, Detroit, Michigan 48226 313 965-0036
211 Willowbrook Lane, West Chester, Pennsylvania 19382 215 436-0532

JOB ALLEN PARK CLAY MINE PROJECT NO. 85347 OW SHEET NO. 12
SUBJECT DIFFERENTIAL SETTLEMENT OF INTERIM COVER BY TS DATE 5-18-88
CHK. BY CJH DATE 5-23-88

CONCLUSIONS

1. ALONG THE WESTERN BOUNDARY OF THE PROPOSED CELL II, DIFFERENTIAL SETTLEMENT ON THE ORDER OF 5.3 INCHES OVER A HORIZONTAL DISTANCE OF 10 FT IS EXPECTED.

2. DIFFERENTIAL SETTLEMENT OF THIS ORDER OF MAGNITUDE WOULD THEORETICALLY CAUSE THE CLAY COVER TO CRACK. THE CRACKS WILL PENETRATE ABOUT 3 FT INTO THE 6-FT CLAY COVER AS SHOWN BELOW



SECTION THROUGH INTERIM COMPOSITE COVER

3. AS SHOWN ABOVE, AT LEAST 3 FT OF CLAY IN THE 6-FT CLAY COVER WILL REMAIN UNCRACKED.

4. ELONGATION OF THE PVC FML SHOULD BE WITHIN TOLERABLE LIMIT.

SECTION 13

POST-CLOSURE PLAN

TABLE OF CONTENTS

List of Attachments

SECTION 13

POST-CLOSURE PLAN

13.1 General Information

This Post-Closure Plan is prepared pursuant to requirements under 40 CFR Part 264.117 and 40 CFR 270.14(b)(13). This plan addresses those activities necessary for the proper management of the facility during the 30-year post-closure period [40 CFR Part 264.117(a)(1)]. Should the post-closure plan need to be revised, an amendment to the plan shall be requested according to the provisions of 40 CFR 264.118(d).

The primary areas of responsibility include monitoring, inspection, and maintenance activities and their frequencies. During post-closure, damaged or malfunctioning equipment or structures will be repaired or replaced as necessary to maintain the facility in proper condition.

Included in this are the post-closure cost estimates, which detail the expenses associated with the management and execution of the post-closure plan. In accordance with 40 CFR part 264.118(b)(3), the person to contact about the Allen Park Clay Mine Landfill during the post-closure care period is:

Jerome S. Amber, P.E.
Manager, Site Management and Investigation
Ford Motor Company
Phone: (313) 322-4646
15201 Century Drive, Suite 608
Dearborn, MI 48120

In accordance with R299.9613, no later than 60 days after completion of the 30-year post-closure care period, Ford will submit to the MDNR, by registered mail, a certification that the post-closure care activities were performed in accordance with this plan.

Per the requirement of 40 CFR 264, a restrictive covenant has been filed with the local zoning authority (see Attachment 13A).

13.2 Inspection Activities and Frequencies

Final Cover

The entire landfill surface (final cover) must be examined quarterly for the 30-year post-closure period for evidence of erosion damage, subsidence that could potentially lead to surface water ponding, animal damage, and the presence of inadequate and inappropriate vegetative cover [in accordance with 40 CFR Part 264.118(b)(2)(i)]. To inspect the cover integrity, the site inspector shall walk the entire site on an approximate 100 by 100 foot grid pattern checking cover condition. Inappropriate vegetation includes trees or other plant life with deep-rooted structures. In general, conditions that lead or could lead to increased surface water infiltration will be noted. Refer to Attachment 13B, for the Post-Closure Inspection Report.

Drainage Structures

The quarterly inspection of the drainage structures involves observation of erosion and sediment build-up along the ditches, spillways, and diversion berms.

The sedimentation basins are inspected for blockage and visible impacts to surface water quality. Debris and/or objects that block passage is removed.

Monitoring Wells

Individual well security devices (caps, covers, locks) are inspected quarterly for malfunctions, deterioration, vandalism, and damage. The observable portion of the well casing is inspected for deterioration or damage (e.g., cracks, casing alignment [damage from vehicle contact]), and insect or animal infestation. The grout at the base of the casing is checked for proper seal to prevent surface water infiltration down the side of casing.

Security System

Fencing gates and locks are inspected quarterly for vandalism, deterioration, or damage that could result in unauthorized entry. Warning signs are inspected for legibility due to weathering or vandalism, and a sign count is conducted to determine losses.

Leachate Collection System

The leachate collection system manholes and utility corridor are inspected quarterly. The manhole covers are inspected to verify their presence and proper placement. Above-ground and interior portions of the manhole are inspected for damage or deterioration. The leachate collection pumping system is inspected quarterly for the following: damage or deterioration to

the electrical control panel; and malfunctions, damage, or deterioration of the flow meter. Discharge lines are inspected, if applicable, for deterioration, damage, and leaks. The pump and lines in the manhole are inspected for deterioration, damage, and leaks. The path of below-ground discharge lines is inspected for evidence of damage or malfunction (look for damp, saturated and/or discolored soil along buried pipe runs, loss of vegetation, and puddles).

Leak Detection System

The leak detection system manholes are inspected quarterly. The manhole top covers are inspected to verify their presence and proper placement. Above-ground and interior portions of the manhole are inspected for damage or deterioration. The leak detection pumping system is inspected quarterly for the following: damage or deterioration to the electrical control panel; and malfunctions, damage, or deterioration of the flow meter. Discharge lines are inspected, if applicable, for deterioration, damage, and leaks. The pump and lines in the manhole are inspected for deterioration, damage, and leaks. The path of below-ground discharge lines is inspected for evidence of damage or malfunction (look for damp, saturated and/or discolored soil along buried pipe runs, loss of vegetation, and puddles). Water levels are checked and recorded.

Benchmarks

Benchmarks are inspected annually. The location is reconfirmed along with the physical condition of the permanent benchmarks.

13.3 Maintenance Activities

In accordance with 40 CFR Part 264.118(b)(2) and 40 CFR Part 265.310(b), the following maintenance activities have been identified.

13.3.1 Final Cover

Periodic inspections are performed to determine if and when additional maintenance is needed. Inspections of the final cover are specifically directed toward the identification of the following:

- Invasion of undesirable plant species
- Deterioration of vegetative cover
- Areas of surface erosion

- Soft or unstable areas of the cover
- Damage to the dikes
- Obstructions, erosion, or deterioration of the surface water drainage ditches and spillways
- Obstructions or damage to the discharge pipes for the drainage layer
- Burrowing by animals
- Surface disturbance due to unwarranted vehicle traffic

Detection of problems such as those presented above require remedial efforts. The remedial efforts, including fertilizing and reseeding, are undertaken to bring the cover back to the original designed condition, as necessary.

Erosion washouts will be repaired as soon as possible after detection. When cap integrity is in question, repair activities will begin immediately. Restoration of vegetative cover will be performed during or at the end of the growing season.

In the event of localized subsidence that results in the ponding of surface water, repairs will involve building up the subsided area with soil to provide adequate surface water run-off.

The vegetative cover is mowed twice a year to promote vegetative growth and surface water drainage, and to help improve the site's aesthetics. Vegetative cover that is lost or destroyed due to weathering is replaced in order to control erosion. In accordance with 40 CFR Part 264.310(a)(2), the Allen Park Clay Mine Landfill final cover functions with a minimum of maintenance.

The maintenance of the vegetative cover also includes the elimination of undesirable trees or brush growth over the capped areas when apparent. Burrowing animals will be exterminated immediately after being identified.

13.3.2 Drainage Structures

Ditches, diversion berms, and spillways that have been damaged due to erosion will be properly repaired. Sediment buildup will be removed where necessary to allow free gravity drainage to the sedimentation basin. Removal of sediment buildup in the sedimentation basin will also be performed as needed to maintain adequate capacity for design flow conditions.

13.3.3 Monitoring Wells

The primary anticipated maintenance concerns will be security and casing integrity. Should damage occur to the wells, they will be repaired or replaced promptly. If damage is done to the locking system or the well casing, it will also be repaired.

13.3.4 Security

Signs will be replaced as they become illegible or if lost due to vandalism. In the event of fence or gate damage, those sections affecting site security will be repaired or replaced immediately.

13.3.5 Leachate Collection System

The primary anticipated maintenance concerns will be pump operations. Should damage or failure occur to this system, repair or replacement of the defective equipment will be performed promptly.

The leachate collection piping will also be maintained by jetting or cleaning out the pipe's interior at least once every other year.

13.3.6 Leak Detection System

The primary anticipated maintenance concerns will be pump operations. Should damage or failure occur to this system, repair or replacement of the defective equipment will be performed promptly.

13.3.7 Benchmarks

Should the benchmarks be dislodged or removed entirely, they will be reset or re-established at the original location and elevation.

13.4 Monitoring Activities

In accordance with 40 CFR Part 264.310(b)(2), during the post-closure care period, the leachate collection and removal system will continue to be operated until leachate is no longer detected. The environmental monitoring system will be maintained and monitored throughout the post-closure period in accordance with 40 CFR Part 264.310(b)(3).

13.5 Financial Assurance

The financial assurance documentation and detailed cost estimate is included in Attachment 13C. The costs presented are based on the costs associated with a third-party to close the facility.

Annual monitoring costs for the site will increase by approximately $10,000 over previous estimates due to the change in the sampling parameters list. This change will be reflected in subsequent financial assurance filings submitted by Ford.

ATTACHMENT 13A

RESTRICTIVE COVENANT

DISPOSE of Copies (Black Stamped) RETAIN Record (Red Stamped) PERMANENT

Schedule Number: 10-5-2

Inter Office

Office of the General Counsel

401 PTW
390-1877

August 2, 1989

RECEIVED
STATIONARY SOURCE
ENVIRON CONTROL SEC

'89 AUG -8 AM 10

Marilyn Taulbee
Secretary's Office

Restrictive Covenants
Allen Park, Michigan

Attached for filing with the property records is a document executed May 3, 1989, whereby Ford Motor Company has adopted restrictive covenants that apply to property in Allen Park, Michigan. This document is required under the terms of a license issued by the Michigan DNR for disposal of hazardous waste.

George Kircos

Attachment
2131j

cc: David A. O'Connor

89078418

LI 24200 PA 045

RESTRICTIVE COVENANTS RUNNING WITH THE LAND

FORD MOTOR COMPANY ("Ford"), a Delaware corporation, is located at The American Road, Dearborn, Michigan 48121-1899.

Ford is the record owner of land located in the City of Allen Park, Wayne County, Michigan, described in Exhibit A attached ("the land").

89078418

Ford applied for and received a license under provisions of 1979 PA 64, MCLA 299.503 et seq, as amended ("Act 64") to operate a hazardous waste facility ("Disposal Facility") located at the land. This license authorized disposal of hazardous waste at the Disposal Facility on the land pursuant to all of the terms of that license and Michigan law, including, but not limited to, Act 64. The land and the Disposal Facility are herein referred to as the "Property". The following restrictive covenants are executed by Ford as the sole owner of the Property pursuant to Section 39 of Act 64 to ensure the care, maintenance, monitoring and long term integrity of the Property for the protection of the health, safety and welfare of the people of the State of Michigan and the natural resources and the environment of the State of Michigan.

1. The Property has been used to manage hazardous wastes.

2. The Property has been used as a landfill for hazardous waste disposal.

3. Use of the Property, including use of the land and/or the Disposal Facility, shall not disturb the final cover, liners, components of any containment system, or the function of the monitoring systems on or in the Property.

4. No one, including Ford, any purchaser of the record owner of the land or Disposal Facility, any purchaser of the land or Disposal Facility, or any of their agents, employees, heirs, successors, lessees, or assignees, shall engage in any development, including any filling, grading, excavating, building, drilling or mining on the Property following completion of the landfill closure without obtaining prior written authorization from the Director of the Department of Natural Resources.

5. The survey plat and records of the types, locations and quantities of hazardous wastes on or in the Property have been filed with the local zoning or land use authority as required by Act 64 and its rules.

6. Ownership of all or a portion of the land or Disposal Facility shall not be conveyed without the owner of the land or Disposal Facility sending prior written notice to the prospective purchaser(s) of the existence of these restrictive covenants. Such notice shall state:

(1) that there are restrictive covenants on the Property;

(2) that development on the Property is prohibited without prior written authorization from the Director of the Department of Natural Resources;

(3) that the prospective purchaser(s) must comply with the restrictive covenants, Act 64 and rules promulgated under Act 64; and

(4) that the prospective purchaser(s) cannot interfere with the containment or monitoring systems on or in the Property.

Such notice shall include a copy of these restrictive covenants and shall be sent to the prospective purchaser(s) by certified mail with a copy sent to the Director of the Department of Natural Resources.

These restrictions may be enforced in law or in equity in a court of competent jurisdiction. Such action(s) may be taken against anyone, including any person, corporation, partnership, agent, successor, assignee, heir, employee or lessee, who violates or threatens to violate any of these restrictive covenants.

These restrictive covenants shall run with the land in perpetuity and shall be binding upon Ford, any purchaser of the

record owner of the land or Disposal Facility, any purchaser of the land or Disposal Facility, or any of their agents, employees, heirs, successors, lessees, or assignees.

Signed in presence of:

Jerome S. Amber

David A. O'Connor

Cheryl L. Howe

Toots Lapata-Victorson

FORD MOTOR COMPANY

By: J. M. Rintamaki

Its: Assistant Secretary

STATE OF MICHIGAN

By: David F. Hales

Its: Director of the Department of Natural Resources for the State of Michigan

JOAN E. SAUB
Notary Public, Clinton County, MI
My Commission Expires April 7, 1991
Acting in Ingham County, MI

STATE OF MICHIGAN)
) SS.
COUNTY OF WAYNE)

The foregoing instrument was acknowledged before me this third day of May, 1989, by J. M. Rintamaki, of FORD MOTOR COMPANY, a Delaware corporation, on behalf of the corporation.

Notary Public, Oakland County, MI
My Commission Expires 1990
Peggy Collins

1255u

EXHIBIT A

LI 24200 PG 049

LEGAL DESCRIPTION OF HAZARDOUS WASTE CELLS
AT FORD MOTOR COMPANY
ALLEN PARK CLAY MINE

A parcel of land in Private Clain 66 also being part of Lots 1, 2, 3 and 4 of Walker and Wilcox Plat of P.C. 66, City of Allen Park, Wayne County, Michigan, more particularly described as:

Beginning at a point distant S 58° 37' 20" E, 1697.41 feet, and S 48° 23' 02" W, 491.60 feet, and S 23° 45' 37" W, 583.36 feet, and S 70° 48' 45" E, 527.01 feet from the SE corner of Southfield Expressway (350 feet wide) and Oakwood Boulevard (100 feet wide) and continuing thence S 61° 21' 45" E, 218.07 feet; thence S 85° 38' 46" E, 143.76 feet; thence S 62° 00' 53" E, 47.79 feet; thence S 36° 52' 13" E, 101.55 feet, thence S 38° 04' 32" E, 103.44 feet; thence S 19° 17' 50" W, 281.45 feet; thence S 31° 34' 40" W, 294.98 feet; thence N 58° 26' 05" W, 644.32 feet; thence S 31° 32' 52" W, 106.55 feet; thence N 58° 26' 05" W, 525.00 feet; thence N 31° 32' 52" E, 643.15 feet; thence S 61° 21' 45" E, 525.68 feet to the point of beginning. Containing 16.500 acres of land, more or less.

DRAFTED BY
AND
RETURN TO
PETE QUACKENBUSH
P O BOX 30028
LANSING MICHIGAN 48909

ATTACHMENT 13B

POST-CLOSURE INSPECTION REPORT

ATTACHMENT 13B

Post-Closure Inspection Report
(Inspections Performed on a Quarterly Basis Unless Otherwise Noted)

Date: _____ Inspector (initials): _____

Time: _____

GENERAL CATEGORY	SPECIFIC ITEM	STATUS*
Final Cover	Surface of Final Cover	( )
	Final Cover Spillways and Diversion Berms	( )
	Drainage Layer Collection Piping Outlet	( )
Security Devices	Warning Signs	( )
	Fencing	( )
	Barriers	( )
Monitoring Equipment	Ground Water	
	Monitoring Well Security	( )
	Monitoring Well Integrity	( )
	Leachate Collection Lines	
	Discharge Lines	( )
	Utility Corridor Manholes	( )
	Access Manholes	( )
	Pump System Integrity	( )

* Indicate (x) for satisfactory conditions, (1,2, etc.) for unacceptable conditions. All unacceptable conditions must be numbered and explained in remarks section; include corrective action necessary and estimated date of completion.

Remarks: _____

_____

(Add additional sheets if necessary)

2804.07 0000;RTF:ford0910.14

Post-Closure Inspection Report
(Inspections Performed on a Quarterly Basis Unless Otherwise Noted)

GENERAL CATEGORY	SPECIFIC ITEM	STATUS*
Monitoring Equipment (Cont'd)	Leachate Collection Lines (Cont'd)	
	Flow Meters and Valves	( )
	Transfer Piping	( )
	Leak Detection System	
	Discharge Lines	( )
	Access Manholes	( )
	Pump System Integrity	( )
	Flow Meters and Valves	( )
Structures/Appurtenances	Drainage Structures	( )
	Ditches	( )
	Sedimentation Basin	( )
	Miscellaneous	
	Facility Benchmarks	( )
	- Annual Inspection Only -	

* Indicate (x) for satisfactory conditions, (1,2, etc.) for unacceptable conditions. All unacceptable conditions must be numbered and explained in remarks section; include corrective action necessary and estimated date of completion.

Remarks: _____

_____

(Add additional sheets if necessary)

2804.07 0000:RTF:ford0910.14

ATTACHMENT 13C

FINANCIAL ASSURANCE

Ford Motor Company

The American Road
P.O. Box 1899
Dearborn, Michigan 48121-1899

March 24, 1995

Director
State of Michigan
Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Subject: **Hazardous Waste Management Financial Assurance Filings**

Dear Sir:

Enclosed are the following documents required for the annual Hazardous Waste Management Financial Assurance filing:

- A letter from the Chief Financial Officer, Mr. J. M. Devine, regarding liability and closure and post-closure care.
- A special report from the independent certified public accountant regarding the financial data contained in the Chief Financial Officer's letter.

A copy of the Annual Report on Form 10-K for the completed fiscal year, ended December 31, 1994 is not yet available. This will be sent to you in early April 1995.

If you have any questions or require submission of additional information, please contact our office in writing so that we may comply promptly.

Sincerely,

M. K. Wells
Corporate Insurance

Enclosures

a:\polfil\hzwst\michcve.95

Ford Motor Company

The American Road
P.O. Box 1899
Dearborn, Michigan 48121-1899

March 20, 1995

Director
State of Michigan
Department of Natural Resources
P.O. Box 30028
Lansing, MI

Subject: **Hazardous Waste Management Financial Test Requirements**

I am the Chief Financial Officer of Ford Motor Company, The American Road, Dearborn, Michigan 48121-1899. This letter is in support of the firm's use of the financial test to demonstrate financial capability as specified in Part 7 of the Act 64 Administrative Rules.

1. This firm is the owner or operator of the following facilities for which financial responsibility for liability coverage is being demonstrated through the financial test specified in Part 7 of the Act 64 Administrative Rules.

See Attachment 1

2. This firm guarantees, through the corporate guarantee specified in Part 7 of the Act 64 Administrative Rules, liability coverage for the following facilities owned or operated by its subsidiaries:

None

3. This firm owns or operates the following facilities for which financial assurance for closure or post-closure care is demonstrated through the financial test specified in Part 7 of the Act 64 Administrative Rules. The current closure and/or post-closure cost estimates covered by the test are itemized separately for each facility:

See Attachment 1

4. This firm guarantees, through the corporate guarantee specified in Part 7 of the Act 64 Administrative Rules, closure and post-closure care of the following facilities owned or operated by its subsidiaries. The current cost estimates for closure or post-closure care so guaranteed are itemized separately for each facility:

None

5. In other states where EPA is not administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Part 264. The current closure and/or post-closure estimates covered by such a test are itemized separately for each facility:

See Attachment 1

6. In other states where EPA is not administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial responsibility for liability coverage for the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Part 264. The liability coverages covered by such a test are itemized separately for each facility:

See Attachment 1

7. In states where EPA is administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of the financial test specified in Subpart H of 40 CFR Part 264. The closure and/or post-closure cost estimates covered by this test are itemized separately for each facility:

None

8. In states where EPA is administering the financial requirements of Subpart H of 40 CFR Part 264, this firm, as owner or operator or guarantor, is demonstrating financial responsibility for liability coverage for the following facilities through the use of the financial test specified in Subpart H of 40 CFR Part 264. The liability coverages covered by this test are shown for each facility:

None

9. This firm is the owner or operator of the following hazardous waste management facilities for which financial capability is not demonstrated either to EPA or a state through the financial test or any other financial assurance mechanism specified in Subpart H of 40 CFR Part 264 or equivalent or substantially equivalent state mechanisms. Both the liability coverages and current closure and/or post-closure cost estimate amounts not covered by such financial assurance are itemized separately for each facility:

None

10. This firm is the owner or operator of the following UIC facilities for which financial assurance for plugging and abandonment is required under 40 CFR Part 144. The current plugging and abandonment cost estimates as required by 40 CFR 144.62 are itemized separately for each facility:

None

This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk (*) are derived from this firm's independently audited, year-end financial statements for the latest fiscal year, ended December 31, 1994.

Alternative 2

1.	Sum of current closure and post-closure cost estimates for Michigan facilities (total of all cost estimates listed in above paragraphs 3 and 4)	$ 42,407,358
2.	Sum of current closure and post-closure cost estimates for non-Michigan facilities (total of all cost estimates listed in above paragraphs 5, 7, and 9)	$ 100,000
3.	Sum of current plugging and abandonment cost estimates for all UIC facilities for which financial assurance is required under 40 CFR Part 144 (total of paragraph 10)	$ 0
4.	Amount of annual aggregate liability coverage (maximum aggregate for facilities listed in above paragraphs 1, 2, 6, 8, and 9)	$ 10,000,000
5.	Sum of lines 1, 2, 3, and 4	$ 52,507,358
6.	Current bond rating of most recent issuance and name of rating service	A+ Standard & Poor's
7.	Date of issuance of bond	June 17, 1993
8.	Date of maturity of bond	June 15, 2043
*9.	Tangible net worth (if any portion of the closure or post-closure cost estimates is included in "total liabilities" on your financial statements, you may add that portion to this line)	$ 11,168 million
*10.	Total assets in the U.S.	$169,672 million
11.	Total assets in Michigan excluding the value of land used for hazardous waste disposal. 1/	$ 7,543 million
12.	Total assets in Michigan including the value of land used for hazardous waste disposal. 1/	$ 7,549 million

		Yes	No
13.	Is line 9 at least $10 million?	X	___
14.	Is line 9 at least 6 times line 5?	X	___
*15.	Are at least 90% of firm's assets located in the U.S.? If not, complete line 16.	___	X
16.	Is line 10 at least 6 times line 5?	X	___
*17.	Is line 11 at least $50 million?	X	___
18.	Is line 12 at least 6 times line 1?	X	___

- - - - -

1/ This number represents total inventory, net, and property plant, special tools and equipment, net in Michigan at December 31, 1993. It excludes assets of Ford Motor Credit Company, First Nationwide Bank, and other finance subsidiaries.

I hereby certify that the wording of this letter is identical to the wording in the letter specified by the Director for the financial test as such letter was specified on the date shown immediately below.

Signature

J. M. Devine
Name

Chief Financial Officer
Title

3/25/95
Date

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Table 1
1995 Closure and Post-Closure Estimates for Company
RCRA Facilities

Ford Motor Company Owned/Operated Facilities	Region	EPA I. D. No.	Liability Coverage	Closure Costs	Post-Closure Costs	Total
Allen Park Clay Mine 17005 Oakwood Boulevard Allen Park, MI 48101	V	MID980568711	Sudden & Nonsudden	$813,850	$1,133,663	$1,947,513
Milan Plastics Plant 800 County Street Milan, MI 48160	V	MID091955476	Sudden	$50,000	-- --	$50,000
Monroe Stamping Plant 3200 E. Elm Avenue Monroe, MI 48161	V	MID005057005	Sudden & Nonsudden	$39,236,425	$1,173,420	$40,409,845
Loral Aerospace Corp. (Lessee) Ford Road Newport Beach, CA	IX	CAD041330077	Sudden	closed (see attached letter)	closed	closed
33600 Ortega Highway San Juan Capistrano, CA	IX	CAD981393085	Sudden	$100,000	-- --	$100,000
Ford Motor Company Total				$40,200,275	$2,307,083	$42,507,358

Coopers &Lybrand

Coopers & Lybrand L.L.P.

a professional services firm

Ford Motor Company
Dearborn, Michigan

We have audited the consolidated financial statements of Ford Motor Company and Subsidiaries for the years ended December 31, 1994 and 1993, and have issued our report thereon dated January 27, 1995. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

Mr. J. M. Devine, Ford Motor Company Chief Financial Officer, stated in a letter to the Director of the Michigan Department of Natural Resources that at December 31, 1994 consolidated tangible net worth was $11,168 million and total assets in the United States aggregated $169,672 million and that at December 31, 1993 net inventory and net land, plant, special tools and equipment of the Company's Automotive Operations in Michigan totalled $7,549 million. He further stated that total assets in the United States were less than 90 percent of total worldwide assets.

We have compared this data with corresponding data included in or derived from the financial statements referred to above. On the basis of this comparison, no matters came to our attention that caused us to believe that the data specified above should be adjusted.

Coopers & Lybrand L.L.P.
400 Renaissance Center
Detroit, Michigan 48243
March 21, 1995

STATE OF CALIFORNIA — ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

PETE WILSON, Governor

Region 4
245 West Broadway, Suite 425
Long Beach, CA 90802-4444

February 1, 1995

Mr. Jerome S. Amber, P.E.
Manager, Wastes and Hazardous Substances
Environmental Quality Office
Ford Motor Company
15201 Century Drive, Suite 608
Dearborn, Michigan 48120

Dear Mr. Amber:

ACCEPTANCE OF CLOSURE CERTIFICATION: FORD MOTOR COMPANY (FORMER FORD AERONUTRONIC/LORAL AERONUTRONIC), 1000 FORD ROAD, NEWPORT BEACH, CALIFORNIA (EPA ID NO. CAD041330077)

The Department of Toxic Substances Control (Department), has reviewed the Closure Certification Report dated June 1, 1994, including a Health Risk Assessment Report dated March 31, 1994, for the Ford Motor Company (former Ford Aeronutronic/Loral Aeronutronic), facility. The report certifies that you have closed a Container Storage facility, including an adjacent Lab Pack unit in accordance with the Department approved Closure Plan dated November 8, 1991. The Department hereby accepts the Closure Certification and considers your Container Storage facility including the Lab Pack unit at the Ford Motor Company facility closed. Upon acceptance of this Closure Certification, the facility may operate as a hazardous waste generator in accordance with the California Code of Regulations, Title 22, Division 4.5, Chapter 12.

The Department's acceptance does not certify that the subject facility will not pose an environmental or public health threat. Neither does this acceptance release you from any liabilities associated with past hazardous waste management practices which occurred at your facility. Pursuant to the Health and Safety Code, Section 25817, the Department may issue an order specifying corrective action if the Department determines that there has been a release of hazardous waste or constituents into the environment from any solid waste management units at your facility. Solid waste management units are any units or areas at a hazardous waste facility from which hazardous constituents might migrate, irrespective of whether the units or areas were intended for the management of wastes.

The Department is aware that the California Regional Water Quality Control Board (CRWQCB), Santa Ana Region, is overseeing the ongoing site assessment and remediation activities at the former Ford Aeronutronic/Loral facility as per the letter from the CRWQCB dated August 24, 1994 to the City of Newport Beach. Also, CRWQCB will continue to oversee the activities until its concerns regarding protection of the quality of the waters of the State are fully addressed. Therefore, the Department's acceptance of the Closure Certification does not include ground water issues.

Pursuant to the California Code of Regulations, Title 22, Section [66264.143(j)(1) or 66265.143(j)(1)], you are no longer required to maintain financial assurance and liability coverage for the Container Storage facility, including the Lab Pack. You may submit your request for releasing your financial documents to Ms. Joyce Haire, Financial Responsibility Coordinator, Statewide Compliance Branch, at the letterhead address. Ms. Haire may be reached at (310) 590-5930, if you need to contact her.

If you have any questions, please contact Mr. Edaurdo Vallesteros of my staff at (310) 590-4876.

Sincerely,

Mohinder S. Sandhu, P.E., Chief
Facility Permitting Branch

cc: Ms. Paula Bisson
Permits Section (H-3-1)
Hazardous Waste Management Division
U.S.E.P.A., Region IX
75 Hawthorne Street
San Francisco, California 94105

Ms. Jo Nelson
Fees Unit (HQ-2)
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

RCRA/ACT 64 OPERATING LICENSE RENEWAL APPLICATION

FORD

FORD MOTOR COMPANY
ALLEN PARK CLAY MINE LANDFILL
ALLEN PARK, MICHIGAN

VOLUME II
SUPPLEMENTAL INFORMATION

NOVEMBER 1993

EPA ID NO. MID980568711

FORD MOTOR COMPANY
ACT 64 OPERATING LICENSE RENEWAL APPLICATION

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FORD MOTOR COMPANY
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3.	Construction Quality Assurance Plan	Neyer, Tiseo & Hindo, LTD.
4.	Leak Detection Lysimeters	Ford Motor Company
5.	Supplemental Geotechnical Investigation	Neyer, Tiseo & Hindo, LTD.
6.	Slope Stability Investigation Cell II	Neyer, Tiseo & Hindo, LTD.
7.	Compatibility Report - Geosynthetics	RMT, Inc.
8.	Compatibility Report - Soil	Neyer, Tiseo & Hindo, LTD.
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FORD MOTOR COMPANY
ACT 64 OPERATING LICENSE RENEWAL APPLICATION

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